

ORIGINAL ARTICLE

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Assessing the effectiveness of written educational materials on parental knowledge of childhood constipation

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Abstract

Parents frequently consult pediatric gastroenterology clinics seeking guidance for the management of childhood constipation. However, providing comprehensive education during outpatient visits can be challenging due to time constraints and high patient volume. This study aimed to assess the impact of written educational materials on parental knowledge regarding childhood constipation. This single-center, pre-test/post-test study was conducted in a pediatric gastroenterology clinic between May 2025 and August 2025. Parents of children diagnosed with functional constipation completed a self-administered questionnaire immediately before and immediately after reading a written educational material. The questionnaire, developed based on established guidelines and relevant literature, assessed knowledge related to symptoms, etiological factors, and management of childhood constipation. A total of 61 parents were included in the analysis. Following exposure to the educational material, parental knowledge improved across several clinically relevant domains. Increased awareness was observed in the recognition of key diagnostic features, common etiological factors, and treatment principles, including correct toilet posture, recommended treatment duration, and the non-addictive nature of constipation medications. These improvements suggest that written educational materials can meaningfully enhance short-term parental understanding of childhood constipation. Written educational materials appear to be a useful tool for improving parental knowledge and facilitating access to accurate information about childhood constipation in outpatient settings. Such materials may serve as a practical adjunct to routine clinical counseling, particularly in time-limited healthcare environments.

Keywords: Childhood constipation, parents, parental education

Introduction

Constipation is a common gastrointestinal disorder in children, characterized by infrequent bowel movements, difficulty in stool passage, and abdominal discomfort [1,2]. In addition to its physical symptoms, childhood constipation often imposes a substantial psychosocial burden on families, as it negatively affects the child's quality of life and daily functioning [3]. As a result, parents frequently consult pediatric gastroenterology clinics seeking guidance regarding diagnosis, treatment options, and long-term management.

Despite the central role of parental involvement in the management of functional constipation, delivering comprehensive education during outpatient visits remains challenging. High patient volume

and limited consultation time may restrict detailed counseling, increasing the risk that parents leave the clinic with incomplete or inaccurate understanding of the condition and its management. Insufficient parental knowledge has been associated with delayed treatment initiation, suboptimal adherence to therapeutic recommendations, and persistence of symptoms.

In response to these challenges, several studies have explored educational interventions aimed at improving parental knowledge in pediatric settings. Written educational materials, verbal counseling, and multimedia-based interventions have all been shown to enhance caregiver understanding across a range of chronic pediatric conditions [4,5]. Written materials, in particular, offer distinct advantages, including standardization of information, ease of distribution, and the ability to be revisited by caregivers

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after the clinical encounter. Evidence from pediatric asthma and other chronic disease management programs suggests that written resources can improve parental confidence, knowledge acquisition, and home-based management practices [6,7].

However, despite the recognized importance of caregiver education, there remains a notable gap in the literature regarding the use of written educational materials specifically for childhood functional constipation. Existing studies largely focus on clinical outcomes, pharmacological treatment, or long-term behavioral interventions, while fewer have systematically evaluated educational strategies targeting parents. Moreover, the impact of written materials on immediate recall and short-term knowledge acquisition—a critical factor in time-limited outpatient settings—has not been sufficiently addressed.

The present study was designed to address this gap by evaluating the impact of a structured written educational resource on parental knowledge of childhood constipation. By focusing on immediate recall following exposure to written information, this study provides novel insight into the short-term educational value of written materials in routine clinical practice. Understanding how effectively parents can acquire essential information within a single clinic visit may help optimize educational strategies and support more effective management of childhood constipation.

Material and Methods

Study Protocol and Timing

This study aimed to evaluate the effect of written educational materials on parental knowledge regarding childhood constipation. Parents completed a baseline questionnaire (pre-survey) prior to reading the educational material, followed by a post-survey administered immediately after completion of reading.

Accordingly, the post-survey was designed to assess immediate recall of information rather than long-term knowledge retention. The time interval between the pre- and post-surveys was defined as the duration from the initiation of reading the educational material to the completion of the post-survey, ensuring a standardized assessment of immediate recall.

Inclusion and Exclusion Criteria

The study included parents of children diagnosed with functional constipation according to established clinical criteria. Children with organic causes of constipation, including but not limited to Hirschsprung's disease, hypothyroidism, gastrointestinal anatomical malformations, or neurological and neurodevelopmental disorders, were excluded to ensure a homogeneous study population focusing exclusively on functional constipation.

Survey Administration

Both pre- and post-surveys were self-administered, paper-based questionnaires designed to assess parental knowledge before and

after exposure to the educational material. Parents completed the questionnaires independently, without verbal explanation or assistance from the researchers. This approach was selected to enhance reproducibility and minimize potential interviewer-related bias.

Diagnostic Criteria and References

The diagnosis of childhood constipation was established according to the ROME IV criteria for functional gastrointestinal disorders in children and the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) and North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) 2014 guidelines, which provide standardized and widely accepted diagnostic definitions [8]. These guidelines served as the primary references for eligibility determination and diagnosis.

Sample Size and Study Structure

The study included parents of children diagnosed with functional constipation who attended the pediatric gastroenterology clinic between May 2025 and August 2025. A formal a priori sample size calculation was not performed. All eligible parents who agreed to participate during the study period were included. The final number of participants analyzed is reported in the Results section.

Ethical Approval

The study protocol was approved by the Ethics Committee of Antalya City Hospital (Approval No: 6/30; Date: 08 May 2025). Written informed consent was obtained from all participating parents prior to enrollment.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were reported as median (interquartile range, IQR) because the data were not normally distributed. Categorical variables were expressed as frequencies (n) and percentages (%).

Since parental knowledge was assessed before and after the intervention in the same participants, paired categorical comparisons were conducted using the McNemar test. To control for multiple testing arising from 18 paired comparisons, a Bonferroni correction was applied, and a corrected p value of <0.0028 ($0.05/18$) was considered statistically significant.

Effect sizes for McNemar test results were calculated using Cohen's d, with values of 0.05, 0.15, and ≥ 0.25 interpreted as small, medium, and large effects, respectively.

A post hoc power analysis indicated that with a sample size of 61 participants and a large observed effect size (Cohen's $d=1.01$), the study achieved sufficient statistical power to detect significant differences. The internal consistency of the pre-training knowledge items was assessed using Cronbach's alpha, which was 0.57, reflecting the heterogeneous nature of the questionnaire items covering multiple conceptual domains.

Results

The sociodemographic characteristics of the participants are presented in Table 1. The study included 61 children diagnosed with constipation and their mothers.

Table 1. Sociodemographic variables	
Variables	n (%) / Median (IQR)
Total participants	61
Gender	
Female	33 (54.1%)
Male	28 (45.9%)
Age (years)	4.0 (IQR: 2.5-7.0)
Mother's age (years)	34.0 (IQR: 29.0-39.0)
Mother's education	
Primary school	21 (34.4%)
High school	20 (32.8%)
University	20 (32.8%)
Number of siblings	2 (IQR: 1-2)
Data are presented as median (IQR) or number (%). IQR: interquartile range	

No statistically significant association was found between sociodemographic variables (e.g., gender, age, education) and the improvement in knowledge levels. This suggests that the training program was equally effective regardless of the participants' age or educational status (Table 2).

Table 2. Sociodemographic variables			
Variable	Test method	p-value	Result
Gender (Female/Male)	T-Test	p=0.654	Not significant
Mother's educational status	ANOVA	p=0.812	Not significant
Child's age	Pearson correlation	p=0.441	Not significant
Number of siblings	Pearson correlation	p=0.730	Not significant

Changes in parental knowledge and awareness regarding childhood constipation before and after the educational intervention are summarized in Table 3. Paired categorical comparisons were performed using the McNemar test. To control for multiple comparisons, a Bonferroni correction was applied (p<0.0028), and effect sizes were calculated using Cohen's d.

Table 3. Changes in parental knowledge before and after training (paired analysis with effect sizes)

Knowledge / awareness item	Pre-training n (%)	Post-training n (%)	*P-value	Effect size (Cohen's d)
Symptoms				
Defecation <3 times/week	26 (42.6%)	38 (62.3%)	0.004	0.20 (Medium)
Painful/hard defecation	47 (77.0%)	50 (82.0%)	0.581	0.05 (Small)
Large volume stool	14 (23.0%)	30 (49.2%)	<0.001*	0.26 (Large)
Risk factors & causes				
Toilet training mistakes	6 (9.8%)	34 (55.7%)	<0.001*	0.46 (Large)
Delaying defecation urge	21 (34.4%)	40 (65.6%)	<0.001*	0.31 (Large)
Family predisposition	10 (16.4%)	27 (44.3%)	<0.001*	0.28 (Large)
Physical inactivity	13 (21.3%)	28 (45.9%)	<0.001*	0.25 (Large)
School change	1 (1.6%)	14 (23.0%)	<0.001*	0.21 (Medium)
Formula feeding	4 (6.6%)	16 (26.2%)	0.002*	0.20 (Medium)
Starting complementary food	9 (14.8%)	16 (26.2%)	0.065	0.11 (Small)
Diet & lifestyle				
Low water intake	35 (57.4%)	44 (72.1%)	0.035	0.15 (Medium)
Junk food consumption	36 (59.0%)	42 (68.9%)	0.180	0.10 (Small)
Low fiber diet	35 (57.4%)	37 (60.7%)	0.791	0.03 (Negligible)
Treatment & guidelines				
Correct potty training time (>2 years)	51 (83.6%)	58 (95.1%)	0.016	0.11 (Small)
Correct treatment duration	30 (49.2%)	48 (78.7%)	<0.001*	0.30 (Large)
bMedication causes addiction	32 (52.5%)	18 (29.5%)	<0.001*	0.23 (Medium)
Indicating correct sitting position	38 (62.3%)	54 (88.5%)	<0.001*	0.44 (Large)
aP-values calculated using McNemar's test. *Indicates statistical significance after Bonferroni correction (p<0.0028). bFor this item, a decrease in percentage indicates a positive outcome (correction of a misconception).				
Cohen's d: 0.05=small, 0.15=medium, ≥0.25=large effect				

Following the intervention, statistically significant improvements were observed across several key domains. The most pronounced changes were identified in etiological factors, particularly awareness of toilet training mistakes, family predisposition, postponement of the defecation urge, physical inactivity, formula feeding, and school-related environmental changes. The majority of these variables remained statistically significant after Bonferroni correction and demonstrated medium to large effect sizes (Cohen's $d \geq 0.20$). However, among the etiological factors, starting complementary feeding was statistically significant but exhibited a small effect size ($g=0.11$).

Regarding constipation symptoms, correct identification of large-volume stools and reduced bowel movement frequency improved significantly after the training. In contrast, knowledge related to painful or straining defecation did not change significantly, likely due to high baseline awareness.

In terms of management and treatment, correct knowledge of the recommended treatment duration (3-6 months) and proper toilet sitting position increased significantly following the intervention. The improvement in correct sitting position knowledge showed the largest effect size among all variables. Additionally, a significant reduction was observed in the misconception that constipation medications cause addiction, indicating effective correction of false beliefs.

Changes related to water intake, dietary fiber, and junk food consumption did not remain statistically significant after Bonferroni adjustment and were associated with small or negligible effect sizes.

Discussion

This study evaluated the impact of written educational materials on parental knowledge regarding childhood functional constipation and demonstrated meaningful improvements in several clinically relevant knowledge domains. The most prominent knowledge gains were observed in domains related to etiological and behavioral risk factors, including inappropriate toilet training practices, voluntary stool withholding, family predisposition, physical inactivity, school-related environmental changes, and formula feeding. These areas are frequently underrecognized by caregivers despite their well-established role in the development of functional constipation [9-13]. The observed improvements suggest that written educational materials are particularly effective in communicating multifactorial and behavior-related concepts that may not be intuitively understood by parents.

Symptom-related knowledge also improved selectively. Increased recognition of reduced bowel movement frequency and large-volume stools aligns with diagnostic criteria outlined in international guidelines [8,14]. In contrast, no significant change was observed for painful or straining defecation. This likely reflects high baseline awareness, as participating parents

were recruited from a pediatric gastroenterology clinic. Such ceiling effects are common in educational interventions and may limit observable improvement in already well-recognized symptom domains.

Treatment-related knowledge showed substantial improvement, particularly regarding recommended treatment duration and misconceptions about laxative use. The belief that constipation medications cause addiction decreased markedly following the intervention. This finding is clinically important, as fear of dependency is a well-documented barrier to treatment adherence and timely initiation of therapy [8]. Misconceptions are often reinforced by non-scientific information sources, including social media, and may contribute to prolonged symptoms and a decrease in overall quality of life. The present findings indicate that clearly structured written explanations addressing medication mechanisms and safety can effectively counter such false beliefs.

One of the most significant findings of our study was the dramatic improvement in knowledge regarding the correct toilet sitting position. While verbal instructions about "using a footstool" are common in clinical practice, our data showed that visual depiction led to a substantial increase in correct identification (large effect size). This supports the notion that biomechanical concepts such as the straightening of the anorectal angle are better comprehended through visual learning than through text or verbal advice alone [15]. Correcting the defecation position is a cornerstone of non-pharmacological treatment, and our results imply that visual tools should be a standard part of pediatric gastroenterology consultations.

Notably, knowledge related to dietary fiber intake, water consumption, and junk food consumption did not show sustained statistical significance after correction for multiple testing. Several factors may explain this finding. Dietary beliefs are often deeply ingrained, culturally influenced, and shaped by prior counseling and inconsistent public health messaging [16]. Additionally, parents may already hold strong preconceived notions regarding diet, making these misconceptions more resistant to change through a single written intervention. These findings suggest that dietary topics may require repeated reinforcement, interactive counseling, or individualized feedback to achieve meaningful knowledge change. No association was found between sociodemographic variables and improvement in knowledge levels, indicating that the educational material was similarly effective across different ages and educational backgrounds. This supports the generalizability of written educational tools and highlights their potential value as standardized adjuncts to routine outpatient care.

Strengths of the Study

A key strength of this study is its practical and reproducible design. The use of self-administered, paper-based educational materials without verbal explanation minimizes interviewer

bias and reflects real-world outpatient practice. Additionally, the intervention demonstrated a high success rate in correcting clinically important misconceptions, particularly regarding medication safety and toileting practices, which are common barriers to effective management.

Limitations and Future Directions

Several limitations should be acknowledged. First, the study was conducted at a single center with a relatively small sample size, which may limit generalizability. Second, the absence of a control group precludes causal inference regarding the observed knowledge improvements. Third, the internal consistency of the questionnaire, as reflected by a Cronbach's alpha of 0.57, was modest. Although this value is partly attributable to the heterogeneous and multidimensional nature of the questionnaire covering symptoms, etiological factors, and management-related knowledge it may limit the interpretation of the internal consistency and suggests that the scale should be interpreted as an exploratory measure rather than a unidimensional construct.

Most importantly, the post-intervention assessment was administered immediately after exposure to the educational material, measuring short-term recall rather than long-term knowledge retention. Evidence from systematic reviews indicates that educational interventions often produce substantial short-term improvements in knowledge and skills, but these effects may diminish over time without reinforcement and follow-up assessment design [17]. Future studies should therefore incorporate randomized controlled designs, validated outcome measures, and longer follow-up periods to assess the durability of educational gains and their impact on downstream clinical outcomes such as treatment adherence and symptom improvement. Structured educational interventions have been shown to improve treatment adherence in clinical populations compared with usual care, suggesting that both knowledge retention and behavioral outcomes are important targets for rigorous evaluation [18].

Conclusion

This study suggests that written educational materials are associated with short-term improvements in parental knowledge regarding childhood functional constipation, particularly in areas related to etiology, treatment practices, and correction of common misconceptions. While causality cannot be established due to the study design, the findings indicate that such materials may serve as a practical and efficient educational tool in pediatric gastroenterology outpatient settings. In clinical practice, standardized written and visually supported educational materials can be used to complement verbal counseling, reinforce key messages, and address prevalent misconceptions, especially in time-limited clinical encounters. Further research using controlled designs and long-term follow-up is needed to determine whether these knowledge gains translate into sustained behavioral change and improved clinical outcomes.

Ethical Approval

The study protocol was approved by the Ethics Committee of Antalya City Hospital (Approval No: 6/30; Date: 08 May 2025).

Patient Consent

Written informed consent was obtained from all participating parents before inclusion in the study.

Conflict of Interest

The authors declare no conflict of interest.

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