

An investigation of the effects of abdominal massage on the severity of functional constipation in preschool children and the quality of life of their mothers: A randomized controlled study

Okul öncesi çocuklarda abdominal masaj uygulamasının fonksiyonel konstipasyon şiddeti ve annelerin yaşam kalitesi üzerindeki etkilerinin incelenmesi- Randomize kontrollü çalışma

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ABSTRACT

Aim: This study aimed to examine the effect of 12 sessions of abdominal massage on symptoms and quality of life of mothers in children with functional constipation. **Materials- Methods:** Thirty 1- to 6-year-old children diagnosed with functional constipation and their mothers participated in the study. Children were randomly divided into 2 groups, and Group 1 received only pharmacological treatment, while Group 2 received 12 sessions of abdominal massage with pharmacological treatment. Changes in stool consistency and symptoms of constipation were evaluated with the Bristol Stool Scale, Constipation Assessment Scale and mothers' quality of life the Health-Related Quality of Life scale developed by the World Health Organization. **Results:** The mean age of the children was 4.66 ± 1.68 years, and the mothers was 36.54 ± 1.71 years. As a result treatment, the stool consistency of both groups was softened, while the symptoms of constipation in the massage group were reduced. In addition, while no change was observed in the quality of life of the mothers in Group 1, a statistically significant improvement was obtained in the quality of life of the mothers in Group 2. **Conclusion:** As a result, 12 sessions of abdominal massage application in preschool children with functional constipation were effective in softening the consistency of the stool, reducing the symptoms of constipation, and also increasing the quality of life of the mothers. Abdominal massage in children with functional constipation helps to increase the quality of life of mothers by reducing the negative effects of constipation in children.

ÖZ

Amaç: Çalışmamızın amacı, fonksiyonel konstipasyonu olan çocuklarda 12 seanslık abdominal masaj uygulamasının konstipasyon şiddeti ile annelerin yaşam kalitesi üzerindeki etkisini incelemektir. **Gereç-Yöntem:** Çalışmaya 1-6 yaş aralığında fonksiyonel konstipasyon tanısı alan 30 çocuk ve anneleri katıldı. Dahil edilme kriterlerine uyan çocuklar randomize olarak 2 gruba ayrıldı ve Grup 1'e sadece farmakolojik tedavi uygulanırken, Grup 2'ye farmakolojik tedavinin yanı sıra 6 hafta boyunca toplam 12 seans abdominal masaj uygulaması yapıldı. Tedavi öncesi ve sonrasındaki dışkı kıvamındaki değişimler Bristol Dışkılama Skalası, konstipasyona ait semptomlar Kabızlık Değerlendirme Skalası ile değerlendirildi. Annelerin yaşam kalitesi, Dünya Sağlık Örgütü tarafından geliştirilen Sağlıkla İlişkili Yaşam Kalitesi ölçeği kısa Türkçe formu ile değerlendirildi. **Bulgular:** Çalışmaya dahil edilen çocukların yaş ortalaması $4,66 \pm 1,68$ yıl, annelerin yaş ortalaması $36,54 \pm 1,71$ yıldır. Altı haftalık tedavi sürecinin sonucunda her iki grubun dışkı kıvamında yumuşama elde edilirken, sadece masaj uygulanan grubun konstipasyona ait semptomlarda azalma elde edildi. Ayrıca Grup 1'deki annelerin yaşam kalitesinde değişiklik görülmezken, Grup 2'deki annelerin yaşam kalitesinde istatistiksel olarak anlamlı olumlu gelişme elde edildi. **Sonuç:** Fonksiyonel konstipasyonu olan okul öncesi dönemdeki çocuklarda 12 seanslık abdominal masaj uygulamasının, dışkı kıvamının yumuşaması, konstipasyona ait semptomların azalmasında etkili olduğu, ayrıca annelerin yaşam kalitesinin artmasını sağladığı belirlendi.

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INTRODUCTION

Pediatric functional constipation (FC) is common a condition worldwide. It is very important to demonstrate the effectiveness of adjunct treatment methods which can be easily applied by health professionals and families, especially in early childhood, in order to protect children from the side effects of drugs. Constipation in children refers to unusually large and/or hard stools and possibly painful defecation usually less than 3 times a week (1). FC is defined as constipation that is not based on any organic etiology and is an important health problem with a prevalence of 0.5%-32% worldwide. (2). The etiology of FC is complex and it may occur due to many factors such as physiological, psychological, social, cultural and behavioral factors. It is a condition that negatively affects the quality of life of both families and children due to its symptoms such as swelling, abdominal pain, feeling of pressure, bloating, pain with defecation and abdominal tension (3). Constipation in children was reported to be associated with sleep and behavioral problems (4). The pathophysiology of FC in children is unclear and multifactorial. One of the most common causes especially in young children is the suppression of the need for the toilet due to the fear of pain after a painful toilet experience called withholding and the accompanying intestinal slowdown (5). The stool remains in the rectum and the rectal mucosa reabsorbs water in retained stool, making evacuation more difficult. The stools stay in the rectum. Fecal impaction, overflow fecal incontinence, loss of rectal feeling, and ultimately loss of the typical urge to urinate are all possible outcomes of this vicious cycle. As a result of this vicious circle, FC may occur. Additionally, slow peristaltic movement and genetic and social factors are also effective in the formation of FC. Although the efficacy of a gene related to constipation has not been proven in individuals with FC, family history suggests that genetic factors play a role. However, environmental factors and common lifestyle habits that are of common interest to families play a big role. Constipation in children rarely has an organic cause, and symptoms are thought to be of functional origin in more than 95% of cases (6). When the effectiveness of non-pharmacological methods in the management of FC is examined, it has been reported that movement and manipulative interventions such as abdominal massage, reflexology, acupuncture and subcutaneous nerve stimulation show promise in the field of pediatric constipation, but more studies are needed in this area (7).

Massage is a method that has been widely used, especially in recent years (8, 9). There are examples in the literature of its use in children with attention

deficit hyperactivity disorder (ADHD), in order to reduce symptoms, to facilitate the care process and to reduce the burden of care in children who require pediatric palliative care, and to provide treatment in children with acute diarrhea (10-12). Massage involves therapeutic manual methods consisting of a combination of stroking, friction, vibration, percussion, kneading, stretching, and compression movements applied to the superficial soft tissues such as muscle, skin, ligament, and fascia and the structures under the superficial tissues on a systematic and scientific basis (13). Abdominal massage is a convenient, low-cost and effective method. Massage is a systemically applied treatment method for the superficial and deep muscle layers of the connective tissue. Massage increases blood and lymph circulation, reduces muscle tension, and ensures metabolite excretion from the body. In addition, abdominal massage stimulates the parasympathetic system and provides gastrointestinal responses. Direct stimulations on the abdominal wall alternately compress and release parts of the digestive tract. Through mechanical and reflexive methods, it causes changes in peristaltic movement and intra-abdominal pressure and ultimately regulates the passage of wastes through the gastrointestinal tract (14).

This study aimed to investigate the effectiveness of abdominal massage in order to reveal the effectiveness of adjunct treatments in preschool children with FC.

MATERIAL AND METHODS

Children aged 1-6 years, followed up at the Pediatrics Outpatient Clinic of Hatay Mustafa Kemal University with the complaint of constipation and diagnosed with FC according to the Rome IV criteria and their mothers were included in the study. Ethics committee approval required for the study was granted by the Clinical Research Ethics Committee of Hatay Mustafa Kemal University (Approval no: 2021/43; Date: May 6th, 2021). Written and verbal consent was obtained from the families by explaining the details of the study. Children with endocrine, metabolic, neurological diseases, diagnosed with Hirschsprung disease, undergoing anus or intestinal surgery, and children without parental consent were not included in the study. During the study, 58 children were diagnosed. Twenty eight of them could not be included in the study due to the stated reasons. The first child who met the inclusion criteria was included in the massage group, while the following child was included in the control group. With this method, randomization was achieved by taking one child into each group in turn, with 15 children in each group. A total of 30 children who met the inclusion criteria were included in the study (Figure 1). Children were

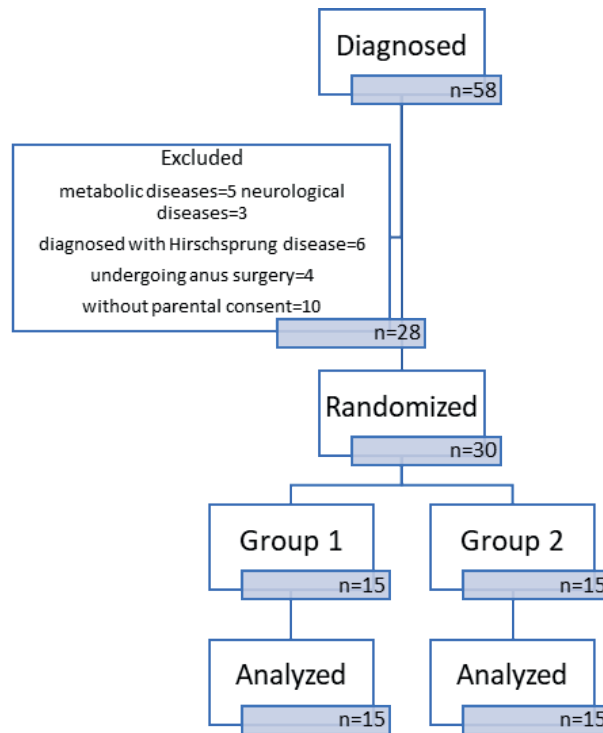


Figure 1. Patient flow diagram

randomized and divided into two groups. While only pharmacological treatment was applied to the children included in Group 1, the children in Group 2 received a total of 12 sessions of abdominal massage, twice a week for 6 weeks, in addition to the pharmacological treatment. All children used laxatives (magnesium hydroxide) in dosage (at least 2 ml/kg) according to individual needs. The family was informed about the use of the drug and the follow-up was carried out by weekly interviews by the physician. Massage was performed in hospital by massage therapists trained in practice and pediatrics. Family caregivers were urged to watch the children receive massages in order to learn calming touch techniques they could employ at home. In addition, families were given the opportunity to practice together. The experienced massage therapist explained the practice to the families at the beginning of the first session and at each session, answering their questions and enabling them to practice, teaching them and encouraging them to practice at home. Massage therapy was applied by the therapist 2 days a week for 6 weeks. Families were also allowed to practice on other days of the week.

During the massage, the child was placed on their back, and the massage applied on the area between the lower edge of the ribs and the anterior superior of the spina iliaca. It begins with a clockwise stroke to the entire abdominal region around the umbilicus. Stroking

on the abdominal muscles and colon were followed by kneading movements. Kneading is a movement that helps to lift and roll the superficial fascia and the underlying muscle mass. In this way, the entire colon was massaged. Kneading was applied from the right lower quadrant with the palm and circular movements of the fingers and hand which made up of numerous tiny, deep clockwise massages that started in the right lower region and ended in the left lower quadrant. Then the massage was completed with colon and abdominal strokes (15). The massage application lasted an average of 30 minutes. In children with dry skin, creams or oils that do not have any therapeutic effect, used by mothers in the routine care of their children, were used to minimize contact friction. There was no child who dropped out or was excluded from the study during the study period. Statistical analysis was performed with 15 children in each group (Figure 1).

The Rome criteria are used in the diagnosis of FC. The symptom-based Rome criteria were first developed for adults in 1989. It has been updated several times over the years, and its latest revision was made in 2016 as the Rome IV criteria. The presence of 2 or more Rome IV criteria for 1 month or more is required for the diagnosis of constipation. The criteria for children are 2 or fewer defecations per week, a history of painful and hard bowel movements, a history of large stools, the presence of large fecal masses in the rectum, fecal incontinence

once a week and/or more, and a history of large stools that may obstruct the toilet (16, 17). Demographic information such as age, height, body weight, gender, and medical treatment status were recorded. The foods consumed daily were questioned. Families were given general information on nutrition, such as not eating a uniform diet, adequate fluid consumption, and unhealthy snacks. During the study, it was said that the diet should not be changed within the correct information, and that nutritional supplements such as cures, which are thought to be good for constipation, should not be used.

Constipation assessment was performed using the Bristol Stool Scale (BSS) and the Constipation Assessment Scale (CAS) at baseline and at the end of 12 sessions. The quality of life scale was administered to the primary caregivers, who were mothers in our study. Therefore, the mothers' quality of life was evaluated using the short Turkish form of the Health-Related Quality of Life scale (WHOQOL-BREF-TR) developed by the World Health Organization. The BSS is a scale that evaluates stool consistency. In this scoring system, stool hardness was determined from the hardest to the softest according to the adhesion and cracking properties of the stool and classified in the Type 1-Type 7 range, where Type 1 and Type 2 refer to severe and mild constipation; Type 3 and Type 4 refer to normal stool; Type 5 refers to stool lacking fiber; Type 6 and Type 7 refer to mild and severe diarrhea (18). The CAS is a valid and reliable scale used in children and adults, consisting of 8 items that the person/caregiver answers about the presence of constipation and its symptoms and severity. Scoring is graded in three points as 0-no constipation, 1-some problem, and 2-severe problem. The total score ranges from 0 (no constipation) to 16 (severe constipation) (19,20).

The WHOQOL-BREF-TR is a scale that measures the physical, mental, social, and environmental well-being of individuals and has a Likert-type score ranging from 1 to 5 (21). Items 3, 4, 26, and 27 with negative scoring are reversed by transforming them to a positive value. The scale includes quality of life and general health items. The first two items in are general items, and the scores of these items are not included in the sub-dimension scores and evaluated separately. In our study, the version consisting of 27 items was used and the analysis was made on the total score of the scale.

The data were analyzed with the SPSS 21.0 package program. A p value of <0.05 was considered statistically significant in all analyses. Continuous variables are presented as mean \pm standard deviation, and categorical variables as numbers and percentages. Since the parametric test assumptions were not met, the Mann-Whitney U test was used to compare independent

group differences. The Wilcoxon paired-sample test was used for dependent group comparisons. The G*Power program (version 3.0.10 Universität Düsseldorf, Düsseldorf, Germany) was used for power analysis. As a result of the power analysis, when at least 12 individuals were included in the study (for each group), it was calculated that 90% power could be obtained at a 95% confidence level.

RESULTS

The mean age of the children participating in the study was 4.66 ± 1.68 years. While the mean age of the children in Group 1 was 5.06 ± 1.48 years, it was 4.26 ± 1.83 years in Group 2. There was no statistical difference between the mean age of the two groups ($p>0.05$). While 11 of the children in Group 1 were female and 4 were male, there were 7 female and 8 male children in Group 2. The mean height of the children in Group 1 was 107.3 ± 1.2 cm and it was 106.2 ± 2.3 cm in Group 2. There was no statistical difference between the mean height of the two groups ($p>0.05$). The mean weight of the children in Group 1 was 18.6 ± 2.1 kg and it was 18.1 ± 1.1 kg in Group 2. There was no statistical difference between the mean weight of the two groups ($p>0.05$). All of the children in the sample group were in the 50-75th percentile range in terms of development. The mean age of the mothers participating in the study was 36.54 ± 1.71 years (Table 1).

When the stool consistency of the children in Group 1, who received only pharmacological treatment, was examined before and after the treatment, the stool consistency, which was type 2 (lumpy and sausage like) before the treatment, was significantly softened and became type 3 (a sausage-shape with cracks in the surface) after the treatment ($p<0.05$). Similarly, the stool consistency of the children in Group 2, who received abdominal massage in addition to pharmacological treatment, which was type 2 before the treatment, changed to type 3 after the treatment ($p<0.05$). There was no statistically significant difference between the groups before and after treatment ($p>0.05$) (Table 2).

Although the CAS is a self-report scale, mothers were allowed to answer the questions in cases where the children could not answer due to their age and cognitive level (22). There were 10 children aged 5 years and younger and 5 children aged 6 years in the control group. In the massage group, there were 12 children aged 5 and under and 3 children aged 6 years. In the whole sample group, attention was paid to the children's expression skills and self-awareness skills in order to answer the questions. As a result, a total of 12 children, including 8 children aged 6 years and 4 children who received pre-school education and were able to express

themselves, were provided with their own answers. When the symptoms of constipation in Group 1 were examined before and after treatment, the value was 14.22 ± 1.43 before the treatment and 13.93 ± 1.16 after the treatment, which was not significant decrease ($p > 0.05$). In Group 2, the value that was 14.40 ± 1.29 before the treatment decreased to 11.13 ± 2.13 after the treatment, which was a significant decrease ($p < 0.05$). When the pre-treatment groups were examined within themselves, it was seen that the CAS values were not statistically different ($p > 0.05$), but the values between the two groups were statistically different after the treatment ($p < 0.05$).

When the quality of life values of the mothers in Group 1 were examined before and after the treatment, the value that was 72.0 ± 5.6 before the treatment was 72.86 ± 5.95 after the treatment, which was not a significant increase ($p > 0.05$). In Group 2, the value that was 68.86 ± 4.95 before the treatment decreased to 78.13 ± 5.28 after the treatment, which was a significant decrease ($p < 0.05$). When the groups were examined before the treatment, the quality of life values were not statistically different ($p > 0.05$), but the values between the two groups were statistically different after the treatment ($p < 0.05$) (Table 3).

Table 1: Demographic information of children and mothers

	Group 1 (n=15) (mean \pm SD)		Group 2 (n=15) (mean \pm SD)		p
Age (year)	5.06 \pm 1.48		4.26 \pm 1.83		0.12
Height (cm)	107.3 \pm 1.2		106.2 \pm 2.3		0.20
Weight (kg)	18.6 \pm 2.1		18.1 \pm 1.1		0.07
Mother's age (year)	37.08 \pm 2.20		36.01 \pm 1.22		0.06
Gender (individual)	n	%	n	%	
Female	11	73.3	7	46.7	0.136
Male	4	26,7	8	53.3	

SD: Standart Deviation; cm:centimeter; kg: kilogram

Table 2: Groups before and after treatment; stool consistency

	Group 1 (n=15) (median)	Group 2 (n=15) (median)	p ₁
BSS	1 (n=7)	1 (n=6)	
Before Treatment	2 (n=8)	2 (n=9)	0.717
After Treatment	2 (n=15)	2 (n=15)	
	3 (n=12)	3 (n=9)	
	4 (n=3)	4 (n=6)	0.083
	3 (n=15)	3 (n=15)	
P₀	0.001*	0.001*	

BSS: Bristol Stool Scale; *: $p < 0.05$; p₀: value within group; p₁: value between groups

Table 3: Groups before and after treatment; constipation symptoms and quality of life values

	Group 1 (n=15) (mean \pm SD)	Group 2 (n=15) (mean \pm SD)	p ₁
CAS			
Before Treatment	14.22 \pm 1.43	14.40 \pm 1.29	
After Treatment	13.93 \pm 1.16	11.13 \pm 2.13	0.713
P₀	0.59	0.002*	0.001*
WHOQOL- BREF-TR			
Before Treatment	72.0 \pm 5.6	68.86 \pm 4.95	
After Treatment	72.86 \pm 5.95	78.13 \pm 5.28	0.126
P₀	0.126	0.001*	0.026*

CAS: Constipation Assessment Scale; WHOQOL- BREF-TR: the short Turkish form of the Health-Related Quality of Life scale; $p < 0.05$; p₀: value within group; p₁: value between groups; SD: Standart Deviation

DISCUSSION

As a result of the study, we determined that 12 sessions of abdominal massage application was effective in reducing the symptoms of constipation in preschool children with functional constipation and these results had positive effects on the quality of life of mothers. It is emphasized that the constipation-reducing effect of abdominal massage may be due to arousal and subsequent relaxation. Abdominal massage application helps to reduce abdominal muscle tension by activating the parasympathetic system, and thereby increases the activity of the digestive system (23). Massage is known to increase vagal activity and gastric mobility (24). In this way, the frequency of bowel movements increases in patients with constipation problems. Pain and discomfort due to constipation are reduced in patients (25). Abdominal massage application is considered a good treatment option due to its advantages such as that it has no side effects and it is low cost (26). Since it can be used by families as well as health professionals with observation, it is an easily accessible and widespread adjunctive treatment. In a systematic review in 2019, researchers investigated the methods used for the treatment of constipation in children and reported that various complementary methods, including massage applications, were effective in the treatment of constipation in children without any side effects (27). In a study comparing the combined use of muscle training, abdominal massage and diaphragmatic breathing, and the effectiveness of medical treatment, 72 children and adolescents aged 4-18 years with FC were included (28). While one group continued to use only medical treatment, as in our study, a physiotherapy program consisting of muscle training, abdominal massage and diaphragm breathing was applied to the other group for 6 weeks in addition to medical treatment. Similar to our study, physiotherapy application was applied 2 days a week. However, while the application time was 30 minutes on average in our study, it took an average of 40 minutes since there were extra applications in this study. As a result, bowel movements in the physiotherapy group increased significantly compared to the medical group, but fecal incontinence did not change. Unlike this study, in our study, medical treatment was applied to one group and abdominal massage was applied to the other group in addition to medical treatment. Muscle training and diaphragmatic breathing were not applied. The length of treatment and the method used in medical treatment are similar to our study. As a result, the gains obtained in both studies showed that massage application was effective on constipation symptoms (28). In a systematic review examining the effect of abdominal massage on gastrointestinal functions, it was emphasized that

abdominal massage is an effective method in reducing the severity of constipation and reducing symptoms such as pain and swelling due to constipation (26). In the present study, stool type before the treatment was 1 and 2 in both groups and it became 3 and 4 after the treatment, which indicates that normal values were obtained from severe to moderate constipation after the treatment.

In the study, which investigated the effectiveness of abdominal massage in infants aged 7-12 months diagnosed with constipation in early infancy, 24 infants were included. Abdominal massage was applied to babies and the results were examined before and after. As a result, it was stated that massage application was effective on constipation in infants aged 7-12 months (29). Unlike our study, in this study, the sessions were applied once without spreading over a long period. However, in our study, the effects of a 12-session treatment process, a total of 6 weeks, were revealed. In addition, unlike our study group, its effectiveness on babies aged 7-12 months was investigated (29). It was found that the application of abdominal massage in older childhood, where behavioral factors and different dietary habits are effective, is effective on constipation.

In a recently published randomized controlled trial, compared the effectiveness of traditional drug therapy and manual physiotherapy in the treatment of FC in children and reported that manual physiotherapy was more effective than drug therapy in increasing the quality of life in children. In the results of the severity of constipation and stool consistency, both methods were effective, but no superiority over each other was found (30). Similarly, in the present study, the application of abdominal massage in children had a positive effect on the severity of constipation and stool consistency and increased the quality of life in children. However, unlike our study, no drug treatment was applied in the abdominal massage group. The present results show that the use of drugs caused a positive change in the consistency of the stool, but it was not as effective as abdominal massage in reducing the severity of constipation and increasing the quality of life of the mothers (30).

Physiological, psychological, social and cultural behavioral factors play a role in the etiology of FC. In a systematic review and meta-analysis, it was reported that the quality of life of children with FC is adversely affected and they have lower quality of life scores than their healthy peers (31). According to the results of the study conducted, the low educational level of the mothers, psychological problems in the mother and the child, and wrong parental attitudes increase the risk of FC in children (32). For this reason,

the authors emphasized that parents should be evaluated psychosocially as well as children (33). In the systematic review, it was emphasized that the parents of children with FC were insufficient in providing care and managing the process because they did not have sufficient knowledge, which affects family dynamics negatively and cause them to have feelings such as shame and guilt (34). In the present study, there was a significant increase in the quality of life of the mothers in the group that received abdominal massage, which may be attributed to the decrease in the complaints of constipation in children with the effect of massage, as well as the provision of correct information to the family during the applications. The pathophysiology of constipation was explained in detail to the families at the beginning of the study and during the process, and the physiological mechanism by which massage could contribute to the treatment was explained. It is thought that the quality of life of the mothers increased due to the frequent interviews conducted during the process and the improvements in constipation. And according to recently published a systematic review, revealing the relationship between childhood constipation and exposure to stressful life events, and emphasized that there is a possible relationship between exposure to stress and the development of constipation in children, and that stress factors related to home and/or school trigger constipation (35). In this study, it was thought that mothers were satisfied with this positive development regarding their children, thanks to the reduction of constipation symptoms. It can be thought that children, whose complaints decrease thanks to the decrease in constipation symptoms, have a positive effect on the psychology of their mothers.

Limitations

This study is very important in terms of demonstrating the effectiveness of the abdominal massage method, which is cost-effective, has no side effects, is non-invasive, and can be easily applied by families. However, our study has some limitations. The quality of life is related to many factors, but whether it was affected by other factors during the 6-week period was not evaluated. Therefore, care should be taken in associating it with results related to constipation. In addition, families were informed that the children's eating habits should not be changed for 6 weeks, but it was only monitored by verbal self-report, and a diary was not kept. Another point is that in addition to the practice of the physiotherapist, the superiority of the application times and techniques of the families who applied massage at home was not evaluated. And the results of our study were not followed up in the long term. Another limitation is the absence of a control group that did not receive medication and

received only abdominal massage. Further studies are needed to evaluate how long the effectiveness of massage application lasts in children.

CONCLUSION

In the present study, 12 sessions of abdominal massage application were found effective in softening stool consistency in children with FC problems, reducing the symptoms and severity of constipation, and also increasing the quality of life of mothers.

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