

# Management of Functional Constipation in Pediatrics Based on Nurse Educational Intervention

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#### Abstract

**Background:** Constipation is a prevalent problem in pediatric patients and one of the ten most common pathological conditions visited by general pediatricians. It accounts for up to 25 percent of referrals to a pediatric gastroenterologist. Therefore, this study was done to evaluate the effects of a nurse-based education program on reducing the symptoms of chronic functional constipation in children.

**Methods:** This clinical trial study was conducted on 95 children (48 control and 47 intervention group), aged 3 to 14 years old, and selected randomly out of the patients referred to Imam Reza Clinic affiliated to Shiraz University of Medical Sciences in 2014. The control group only received the usual treatment prescribed by the physician; however, the intervention group received a comprehensive nursing program. Then, having completed Rome III Criteria Form immediately after the intervention for one month, two months, and three months, we collected the required data. The significance level in this study was 0.05.

**Results:** The mean age of the samples was  $78.30 \pm 32.52$  months in the intervention group and  $74.60 \pm 32.26$  months in the control group. Also, the average weight of children in the intervention group was  $23302.17 \pm 12034.96$  grams and in the control group  $21376.09 \pm 9351.80$  grams. 18% of the samples from the intervention group and 22% of the control group were males. With a follow-up of 3 months, the percentage of changes in the intervention group in items 1 (two or fewer defecation in the toilet per week) and 4 (history of painful or hard bowel movement) was 48.9% and 74.5%, respectively, and in the control group 22.9% and 52.1%, respectively. Therefore, positive changes in the intervention group were better than the control group. The difference between these two variables was statistically significant ( $P < 0.05$ ). In other dimensions of the Rome III criteria, there was no significant difference between the intervention and control groups ( $P > 0.05$ ), despite changes in the percentage of items in different periods of 1, 2, and 3 months.

**Conclusion:** The findings of this study indicate that nursing education programs have a desirable effect on the reduction of some symptoms of chronic functional constipation based on Rome III criteria in children aged 3-14 years.

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**Keywords:** Functional, Constipation, Pediatrics, Nurse Educational Intervention

## Introduction

The prevalence of constipation among children in the entire population of the world varies from 0.79 to 29.6%.<sup>1-7</sup> According to a study conducted in 2007 in the United States for children aged 4 to 17 years, the prevalence of constipation was reported as 22.6%.<sup>8</sup> In Iran, according to a study conducted in 2008 on children admitted to Tabriz Children's Hospital, the prevalence of constipation was reported 43%.<sup>9</sup> Constipation is often considered a major problem for both patient and his or her family, and it imposes many costs on the community.<sup>10</sup> Functional constipation is the most important type of constipation in children.<sup>11</sup> The pathologic cause for this type of constipation has not been found.<sup>12</sup> Treatment for this type of constipation also requires a well-designed program and a collaboration between a team of children, parents and therapists,<sup>13</sup> in which a comprehensive method should be used to evaluate and treat constipation.<sup>11</sup> To achieve effective treatment outcomes in children with constipation, a follow-up program is required,<sup>14</sup> and follow-up programs can partly solve the problem and ensure that the patient continues treatment. Therefore, it is recommended that follow-up visits should be made to discuss the need for dietary modification, behavioral and lifestyle changes, ongoing review of bowel function, toilet training, gradual decrease in medicine use and its subsequent discontinuation.<sup>11</sup> Studies show that nurses can play an important role in the treatment of constipation in children, and the results of this study support the role of nurses in the health care of children with constipation.<sup>14</sup> Based on what was stated above, it can be said that due to the influence of various factors on constipation and the lack of enough follow-up for treatment, which sometimes takes months to years, a comprehensive nurse-based therapeutic program is needed. In order for such a program to be comprehensive, treatment and the resulting outcome have to be followed up on a regular basis by the nurses. Therefore, as one of the main roles of nurses dealing with children is education and treatment, nurses can play the role of an important training resource.<sup>11</sup> As such, a study has not been done in Iran so far and previous studies have focused on follow-up programs; the aim of this study was to evaluate the effect of nurse-based education program on reducing the symptoms of chronic functional constipation based on Rome III criteria in children who referred to Imam Reza clinic affiliated to Shiraz University of Medical Sciences.

## Methods

The present study was approved by Shiraz University of Medical Sciences (CT-92-6775). We conducted the clinical trial study to determine the effects of nurse-based strategies on Rome III criteria items in children aged 3 to 14 years old referred to Imam Reza Clinic affiliated to Shiraz University of Medical Sciences in

2014. The research population consisted of children aged 3-14 years old. The sample size of 52 for each group was determined according to previous studies and using mean difference test in two independent communities (alpha was considered equal to 5%).<sup>10</sup>

This number increased to 60 for each group due to attrition. During the study, some of the subjects were excluded (13 from the intervention group and 12 from the control group) due to the long duration of the program (3 months) and its subsequent follow-up.

By the use of balanced block randomization with 8 to 12 blocks- in each block, six people from the control group, and six people from the intervention group- 48 children participated in the control group, and 47 in the intervention group. The control and intervention groups were randomly assigned to letters A and B. Thus, for each block of 12 patients, 6 letters were allocated randomly to each group. Given that the final sample size was 95 people, in the last block, 6 people from the control group and 5 people from the case group were placed. Using a one-blind method, the researcher divided the people into two groups naming A and B, without knowing the type of groups (intervention and control). Then, having completed the random blocks, the assistant researcher put group A on the intervention and group B on the control group upon a predetermined contract. Data collection instrument included a data collection form and a daily notebook for recording bowel function.

From children aged 3 to 14 years old admitted to the Imam Reza (AS) clinic of Shiraz, those who were diagnosed with chronic functional constipation according to the data collection form (including Rome III criteria)<sup>15</sup> and confirmation by the pediatrician were selected. The other inclusion criteria for the study were children who had received toilet training, literate parents, participation of parents and children in all educational and counseling sessions, and the participants' informed consent forms. Based on the Rome III form, if a child had at least 2 of the following, at least once a week and within 1 month (children older than 4 years, within 2 months), he or she was diagnosed with chronic constipation: (1) two or fewer defecations per week, (2) at least one episode of fecal incontinence per week (after toilet training), (3) history of stool retention, (4) history of painful or hard defecation, (5) presence of a large fecal mass in the rectum, and (6) history of large diameter stools that may obstruct the toilet.<sup>15, 16</sup> Exclusion criteria were: 1.children diagnosed with irritable bowel syndrome, mental retardation, metabolic disease (hypothyroidism), Hirschsprung, spinal abnormalities and rectal abnormalities, 2.children who had undergone gastrointestinal surgery, 3.children who had received medication that affects gastrointestinal motility or any traditional medication other than the

usual treatment, and 4. unwillingness or interruption in cooperation of the child or his/her parents during the research for any reason. As ethical considerations, the information collected was kept confidential and the code was registered instead of the name of the samples in the data collection form.

In this study, first, all participants were given a daily diary of the bowel function for recording symptoms associated with constipation. The intervention group was included in a comprehensive nursing program in addition to the usual treatment prescribed by the physician. Each subject attending the program participated in three training sessions with his/her parents. In each of these sessions, discussions were held on a specific topic and the educational pamphlets containing necessary training points (introduction of constipation, nutrition, and behavioral tips) were given to these parents. In addition, a researcher nurse examined the children's recovery process day by day through a review of their diaries and, if necessary, provided counseling to them and their parents. The follow-up program lasted for 3 months. During this period, the nurse was in touch with the children and their parents on telephone, tracked them out, and provided them with necessary advice. At the end of the study, the control group's diaries were investigated, and the status of the items in the Rome III criteria for each subject in one, two, and three months after the commencement of the nursing program was compared to the situation before the intervention. Children in the control group received only the usual treatment prescribed by their physician. At the end, they were provided with a pamphlet containing some tips about constipation. Finally, applying T-test and chi-square tests, with the significance level of 0.05, the researcher analyzed the data in SPSS version 25.

## Results

Overall, 95 children with constipation participated in this study. Comparison of demographic characteristics of the intervention and control groups did not show a significant difference (Table 1). The mean age in the intervention group was  $78.30 \pm 32.52$  and in the control group  $74.60 \pm 32.26$ . Also, the mean weight in the intervention group was  $2330217 \pm 12034.96$  and in the control group  $21376.09 \pm 9351.80$ .

Table 2 compares the two groups in terms of the

percentage of change in the Rome III items in three periods of time (one month, two months and three months) after the intervention with values before the intervention. Positive change, unchanged, and negative change were used to show the change status. A positive change means that the item was present at the beginning of the study but disappeared at a later time. The word unchanged means that the status of the existence or absence of this item was similar in the two survey periods. The term negative change means that the item was absent before the start of the study but emerged at a later time.

## Discussion

Item No. 1 of Rome III criteria is one of the most important determinants of constipation in children because it is not only the first item referred to in the Rome III criteria, but is also considered as the criterion for the success of treatment in many studies.<sup>17</sup> Comparison of changes in item 1 between the two points of time, i.e. before the study and one month after the study, showed a significant difference between the control and intervention groups, but this difference between the two groups was not significant two months after the study. The positive change in the intervention group was 21.8% compared to the control group. Also, the difference at three months after the study was again significant. Thus, overall, it can be concluded that the reduction of this item, which is beneficial for recovery, was higher in the intervention group than the control group at all three points of time. These findings indicate that the nurse-based strategies during one month, two months, and three months after the intervention had a significantly greater impact compared to the usual physician's treatment on reducing the score of items one (two times or fewer defecation in a week) and increasing the number of defecation per week. This is a very good result. These significant positive changes can be due to training and follow-ups provided to the intervention group by nurse-based strategies. The results of the study by Marieke van Dijk et al. (2008), in a study comparing the combination of laxative treatment and behavioral therapy with traditional therapies, showed that in the traditional group, the number of defecations increased from 2 times a week to 7.2 times and in the group receiving behavioral treatment combined with laxatives it increased from 1.9 to 4.5 times a week. Thus, the rate of increase in defecation frequencies in the traditional group was significantly higher. Likewise,

**Table 1:** Demographic characteristics of the participants

Variables		Case Group	Control Group	P value
Age (month)	Preschool	24 (25.30)	28 (29.50)	0.763**
	School age	20 (21.10)	17 (17.90)	
	Adolescence	3 (3.20)	3 (3.20)	
Gender (Percentage)	Male	18 (18.90%)	21 (22.10%)	0.589**
	Female	29 (30.50%)	27 (28.40%)	

\*The result of t test; \*\*The result of chi square test

**Table 2:** The percentage of changes in the Rome III items in three periods of time (one month, two months, and three months after the intervention) compared to values before the intervention

Rome III Criteria	Group	Change after one month			P value	Changes after two month			P value	Changes after 3 month			P value
		Positive changes	Without changes	Negative changes		Positive changes	Without changes	Negative changes		Positive changes	Without changes	Negative changes	
1.two or fewer defecation in the toilet per week	Case	48.9	46.8	4.3	0.005	44.7	51.1	4.3	0.507	48.9	51.1	0	0.009
	Ctrl	18.8	72.9	8.3		22.9	72.9	4.2		22.9	72.9	4.2	
2.at least one episode of fecal incontinence per week	Case	19.1	80.09	0	0.286	23.4	76.6	0	0.041	21.3	76.6	2.1	0.672
	Ctrl	29.2	68.8	2.1		29.2	60.4	10.4		31.2	66.7	2.1	
3.history of retentive posturing or excessive volitional stool retention	Case	57.4	42.6	0	0.678	61.7	38.3	0	0.604	66	31.9	2.1	0.831
	Ctrl	53.2	46.8	0		54.2	43.8	2.1		60.4	37.5	2.1	
4.history of painful or hard bowel movement	Case	68.1	29.8	2.1	0.140	78.7	19.1	2.1	0.002	74.5	23.4	2.1	.018
	Ctrl	54.2	45.8	0		50	50	0		52.1	47.9	0	
5.presence of a large fecal mass in the rectum	Case	19.1	80.9	0	0.552	19.1	80.9	0	0.552	19.1	80.9	0	0.552
	Ctrl	14.6	85.4	0		14.6	85.4	0		14.6	85.4	0	
6.history of large diameter stools that may obstruct the toilet	Case	53.2	46.8	0	0.765	70.2	29.8	0	0.227	74.5	23.4	2.1	0.182
	Ctrl	56.2	43.8	0		58.3	41.7	0		62.5	37.5	0	

in the follow-up period of 6 months, the frequency of defecation in the traditional treatment was much higher.<sup>18</sup> The results of that study are not consistent with those of the present study. Perhaps, this is because of the longer duration of this study. Furthermore, in Van Dijk's study, child psychologists were responsible for laxative therapy in the behavioral-laxative group, and pediatric gastroenterologists were responsible for the laxative therapy in the traditional group. However, in the current study, pediatric gastroenterologists were responsible for laxative therapy in both control and intervention groups. Additionally, according to the study of Tabbers et al., the combination of behavior therapy and laxative therapy did not have more benefits than laxatives alone.<sup>19</sup> However, Rajindrajith et al. confirmed that web-based behavioral therapy, in combination with traditional laxative treatment, could both reduce fecal soiling and increase defecation frequency.<sup>6</sup>

Item No. 2 of Rome III criteria investigates fecal incontinence, which is the involuntary excretion of a small amount of feces on the child's underwear as one of the most common symptoms of functional constipation in the child, which is found in 84% of children diagnosed with constipation.<sup>20</sup> Comparing the changes between this item before the intervention

and one month after it showed that within one month, the two therapies did not have a significant effect on the reduction of this variable and the difference was not significant, but in two months after the intervention, the effect of nurse-based strategies on the decrease in item number 2 was much higher than the usual physician's treatment, and this difference was statistically significant. However, three months after the same intervention, the impact of both methods on the reduction of this item was equally significant. Despite the similar effects of the two methods in one month and three months after the intervention, 10.4% of the subjects in the control group did not have this problem before the intervention, but they experienced it three months after the study. However, in the intervention group, no new case of this problem was observed. A systematic study by Brazzelli and Griffiths (2006) showed that few studies confirmed the effect of adding behavior modification techniques to laxatives on reducing incontinence,<sup>21</sup> which did not match the results of this study. This is because in this study the number of occurrence of incontinence significantly reduced in the intervention group at all three times compared to the time before the intervention, so that two months after the intervention, the effects of the

intervention was significantly higher than the general treatment of the physician. This may be due to frequent weekly contacts with parents in the intervention group and the emphasis on training provided in previous sessions or because of the use of the award system and positive attitude in this group. Nurse-based strategies were able to reduce the frequency of this item, and this reduction was significantly different from the control group at a certain time (2 months after the intervention).

Item No. 3 of Rome III criteria is a positive record of voluntary fecal retention. One of the main hypotheses behind the training provided in nurse-based strategies is that fear of defecation through the establishment of fecal retention behavior as an avoidance response leads to the persistence of chronic constipation in the child. Laxative treatment can lead to a significant improvement in such behavior because laxatives facilitate the transmission and outflow through softening of the stool. Therefore, laxatives can adequately prevent fecal retention.<sup>22</sup> Although the comparison of the changes in the item between the two groups before and after the intervention (one, two and three months after the intervention) showed that at these points of time, the difference between the two groups was not statistically significant, the changes in this item in the intervention group were more than the control group in all three periods. These findings indicate that both methods affected the reduction of this item almost equally, but the difference between the two groups was not significant enough to be statistically significant despite the strategies and training used in the intervention group, which can be attributed to the similarity of the two groups in terms of laxative treatment as the main factor in this item. Also, some explanations were given to the parents and children of the control group to consider this item and record it in the diary. These explanations might create incentives in children to reduce this behavior and in their parents to pay more attention to this issue and remind their children to go to the toilet. On the other hand, unfortunately, some parents denied their children's intentional fecal retention and interpreted it mistakenly as attempting to defecate, or sometimes they do not pay enough attention to understand their children's behavior. For example, according to some studies, 14% of the parents failed to respond adequately to questions about their children's fecal retention.<sup>20</sup>

Item 4 of Rome III criteria shows a history of hard or painful defecation and is considered as an important indicator in determining the constipation status of a child because it is one of the main causes of intentional fecal retention and may result in the formation of a defective cycle leading to constipation in the child.<sup>15</sup> Comparison of changes in this item between the two groups before the intervention and after it (one,

two and three months after) showed that during the period of one month, the effect of two therapies on the reduction of this item was almost the same and did not show a significant difference, but in two months and three months after the intervention, the effect of nurse-based strategies on decreasing item number 4 was much higher than the usual treatment by the physician, and the difference was statistically significant. The reduction of this item in the intervention group at both two and three months after the intervention, compared to the values before the intervention, was higher than that of the control group.

Item 5 is related to the presence of a large fecal mass in the rectum that can be detected by the doctor in the initial rectal examination of the child. A finger rectal examination is done in almost all suspected cases of constipation, and the doctor then checks the volume of the feces in the rectum and contraction and relaxation of the anal sphincters.<sup>23</sup> In the present study, this item was present before and after the intervention in 19.1% of the intervention group and 14.6% of the control group. During one month after the intervention, the incidence of this item disappeared as a result of effective treatments for this item, which was identical in both the intervention and control groups and it did not emerge later due to the continuation of laxative therapy in both groups. The rate of this variable was zero in one month, two months, and three months after the intervention in both groups; hence, the changes in this item showed no significant difference between the two groups.

Item No. 6 of Rome III criteria shows the history of large diameter stool. Defecation of large mass of stool is one of the most important characteristics of a child with constipation, which usually causes severe discomfort in the child. The painful defecation of such a fecal mass causes the child to be afraid leading to voluntary fecal withholding.<sup>24</sup> Previous studies showed that, according to the Rome III criteria, 2 of these signs were present in 98% of children with constipation.<sup>15</sup> Although there was no significant difference between the two groups at all times, the changes in this item in the intervention group was 11.8% more than the control group two months after the intervention and 22.7% more than the control group three months after the intervention. In other words, two and three months after the intervention, the value of this variable in the intervention group was less than the control group. More reduction of this variable in the intervention group was evident at two months and three months, as compared to the control group. These findings indicate that both methods affected the reduction of this item, but the difference between the two groups in this regard was not statistically significant, which can be attributed to the difference between the forms of Iranian toilet (squat type) with those in western countries (sitting

type). The magnitude of stool mentioned in Rome III criteria is based on sitting toilets. Therefore, to help the parents understand this item, the physicians explained: “stool that looks too large for a child”, which may still be interpreted by different individuals in different ways. Also, checking the size of stool for parents every time a child goes to the toilet is hard and unpleasant, and some children do not have the necessary cooperation with their parents. Also, this measurement is not possible at times when parents are not with their children, such as when they are at school, so the insignificant differences between the two groups can be due to these reasons. The results of Ismail et al.’s study (2011) showed that as a result of participating in a nursing clinic over a period of 3-4 months, the daily rate of defecation in children increased from 22% to 86% and the rate of soft stool cases increased from 43% to 86%. Fecal incontinence decreased from 78% to 40%, and painful defecation decreased from 70% to 18%, so that the difference between the time before the intervention and three months after it was statistically significant for all of these items.<sup>25</sup> It should be noted that these results were consistent with the results of the present study at three months after the intervention.

### Study Limitations

Since the follow-up program lasted for three months, some of the participants withdrew from the study. The difficulty of access to the participants living in a long distance was also out of the researchers’ control. Additionally, the participants’ behavior was affected by their cultural situation and family atmosphere.

### Conclusions

The study revealed that the combination of nurse-based strategies with the usual physician treatment was more effective than physician treatment alone in the improvement of items 1 and 4 from Rome III criteria for diagnosing constipation. Moreover, nurse-based strategies were effective in disease treatment. Therefore, the study findings highly recommend nurse-based strategies to be a part of the therapeutic programs presenting in pediatric gastroenterology clinics.

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**Conflict of Interest:** None declared.

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