



Investigation of Demographic and Clinical Characteristics of Children with Constipation Referring to the Pediatric Gastrointestinal Clinic, Shiraz in 2014 - 2016

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Abstract

Background: Constipation is one of the most common Gastrointestinal (GI) symptoms among children. The present study aimed to identify the demographic and clinical characteristics of the children suffering from constipation.

Methods: This descriptive-analytical study was conducted on 987 children with constipation in Fars province from March 2015 to March 2016. The study data were collected in the pediatric GI clinic affiliated to Shiraz University of Medical Sciences and analyzed using descriptive statistics, including frequency, mean, and standard deviation (SD).

Results: More than 40% of the cases who referred to the pediatric GI clinic were suffering from constipation. Totally, 987 [495 females (50.2%) and 492 males (49.8%)] out of the 1000 children with constipation met the inclusion criteria. The remaining 13 children were excluded due to non-functional constipation. The mean age of the children was 4.8 ± 2.8 years (range: 6.9 months to 17.7 years). In addition, the children's mean age at the beginning of toilet training and defecation control was 1.9 ± 0.5 years (range: 11 months to 5 years) and 2.1 ± 0.6 years (range: 17 months to 8 years), respectively. The mean of daily physical activity was 2.3 ± 3.6 hours and 707 children (71.6%) had less than one hour of daily physical activity. In addition, 54.2% and 13.9% of the children watched TV and used computer games for more than 3 hours a day, respectively. Finally, 57.5% and 48.3% of the children reported a low consumption of vegetables and grains per week, respectively. Furthermore, having constipation for more than six months was associated with the age of onset of constipation less than two years ($P = 0.003$). Watching television was reported in 600 (69.7%) children with more than six months constipation ($P < 0.001$).

Conclusions: More than 40% of the cases who referred to the pediatric GI clinic were suffering from constipation. Furthermore, having constipation for more than six months was associated with the age of onset of constipation and watching television habits.

Keywords: Children, Constipation, Toilet Training, Vegetables

1. Background

Constipation is among the most prevalent gastrointestinal (GI) symptoms in children that, if untreated, can lead to lots of complications (1). Constipation comprises 3% - 5% of inpatient referrals to pediatric physicians and specialists as well as 25% of cases referring to pediatric gastroenterology clinics (2). This disorder does not usually have any structural, endocrine, or metabolic causes and is therefore identified as idiopathic or functional constipation (3). Some studies have indicated that 90% - 95% of cases suffer from functional constipation and only 5% - 10% of children have organic factors (4). It is also a major problem for patients and their families and imposes a great bur-

den on the society (5). According to some studies, 16% of parents reported constipation in their 22-month-old children (6). The multifactorial pathophysiology of constipation has been accepted by researchers. Accordingly, constipation occurred due to various factors, including low consumption of fiber, positive family history, and socioeconomic status (7). Clinical evidence has suggested a relationship between reduction of physical activity and the increase of constipation among children. Several mechanisms have been mentioned for justification of the probable relationship between physical activity and gastrointestinal function among adults. Accordingly, it is believed that physical activity increases intestinal drainage by in-

creasing contents throwing through the colon. Indeed, an increase in energy consumption might enhance energy reception, which could affect the total fiber consumption. Moreover, Salivan explained that increased movement of colon content together with the effect of gravity resulted in the direction of feces towards the rectum and stimulation of defecation. Additionally, the consumption of fibers led to the softness and enlargement of feces resulting in the reduction of the time required for passage of feces from the large intestine. Yet, contradictory reports are available regarding the relationship between fiber consumption and constipation (8).

Considering the prevalence of constipation among children and a small number of large studies conducted on this issue in Iran, the present study aimed to identify the demographic and clinical characteristics of children suffering from constipation in order to improve their quality of life.

2. Methods

Totally, 2474 cases referred to the pediatric GI clinic, a tertiary pediatric referral center affiliated to Shiraz University of Medical Sciences, from March 2015 to March 2016. This descriptive-analytical study was conducted on 1000 cases with constipation that were enrolled in the study through the census. Constipation can be divided into two categories: functional and non-functional constipation. Totally, 987 out of the 1000 children with constipation met the inclusion criteria (Rome III criteria). The exclusion criteria of the study were anatomical causes of constipation (Hirschsprung's disease and spinal disease), chronic constipation because of organic causes such as hypothyroidism, psychomotor retardation, prior anal surgery, and using drugs inducing constipation. It should be noted that Rome III criteria were used for the definition of functional constipation for ages below (6) and above (9) four years. The data were collected by interviewing the mothers using a predesigned questionnaire. This questionnaire included the demographic data, signs, and symptoms at the onset of the disease, date of the beginning of the disease, and information regarding other clinical events. The questionnaires were completed by trained paramedical personnel for all the patients. After all, the data were entered into the SPSS version 19 statistical software and the accuracy of the data was assessed. In case of inaccuracy, necessary modifications were applied by referring to the related questionnaire.

Frequencies, means, and standard deviations were used in presenting the results of descriptive analysis and Chi-squared test was used for comparisons between the groups.

3. Results

Totally, 2,474 cases referred to the GI clinic during one year. Out of these 2,474 cases, 1000 ones with constipation were divided into two categories: chronic functional and non-functional constipation. Totally, 987 [495 females (50.2%) and 492 males (49.8%)] out of the 1000 children with constipation met the inclusion criteria (Rome III criteria). However, 13 cases with non-functional constipation were excluded due to Hirschsprung's disease ($n = 1$; 7.7%), cystic fibrosis ($n = 1$; 7.7%), cerebral palsy ($n = 5$; 38.4%), spinal surgery ($n = 1$; 7.7%), diabetes mellitus ($n = 1$; 7.7%), and Down syndrome ($n = 4$; 30.8%). The mean age of the children was 4.8 ± 2.8 years (Table 1). The children's age ranged from 7 months to 17.7 years and 495 patients (50.2%) were female. The mothers' mean age at pregnancy was 26.7 ± 5.2 years. Additionally, the smallest and the largest number of children were 1 and 11, respectively, and the highest frequency was related to the families with one child (44.1%), followed by those with two children (38.6%). Besides, 371 children (37.6%) were born through natural vaginal delivery, while 616 ones (62.4%) were born through cesarean section. Considering the parents' level of education, the highest frequency was related to high school education [559 fathers (56.8%) and 527 mothers (53.4%)] followed by academic education. The family history of constipation was also reported in 479 patients (48.5%), 302 cases (63.2%) of which were related to the first-degree relatives (father, mother, sister, or brother). Among the children, the mean age at the beginning of constipation was 1.8 ± 2.1 years (range: birth to 15.7 years) and the mean duration of suffering from constipation was 3.1 ± 2.4 years (range: 0.6 months to 16.1 years). The children's mean age at the beginning of toilet training and defecation control was 1.9 ± 0.5 years (range: 11 months to 5 years) and 2.1 ± 0.6 years (range: 17 months to 8 years), respectively. Moreover, the median interval between defecations was 2 days, ranging from 1 to 25 days. Additionally, 590 children were students, 73 ones of whom had at least one episode of defecation at school. Age of the onset of constipation less than two years was detected in 306 (63.1%) girls and 291 (59.9%) boys. Moreover, 448 (93.1%) girls and 445 (91.8%) boys had constipation for more than six months.

According to Table 2, the most common clinical finding was fecal mass in the rectum ($n = 659$, 66.8%). The rate of fecal incontinence once a week or more was 21.6% in total ($n = 84$; 17% in females and $n = 129$; 26.3% in males) and 26% in the children above 4 years of age.

The signs and symptoms reported among the children are presented in Table 3. Among the children, 823 cases (83.6%) had undergone pharmacological treatment before their referral. Accordingly, the highest and the lowest fre-

Table 1. Clinical Characteristics of Children with Constipation^a

Variables	
Age, y	4.8 ± 2.8
Sex (Male/Female)	492/495
Age at the beginning of constipation, y	1.8 ± 2.1
Duration of illness, y	3.1 ± 2.4
Age at the beginning of toilet training, y	1.9 ± 0.5
Age at the beginning of defecation control, y	2.1 ± 0.6
Family history of constipation (yes)	479

^aValues are expressed as mean ± SD.**Table 2.** The Most Common Clinical Findings According to Rome III Criteria^a

Findings	Total	Female	Male
Fecal mass in the rectum	659 (66.8)	333 (67.4)	326 (66.3)
Positive history of large diameter stool	620 (62.8)	305 (61.6)	315 (64.0)
Positive history of painful defecation	599 (60.7)	301 (60.8)	298 (60.6)
Defecation twice a week or less	562 (57.2)	290 (58.8)	272 (55.6)
Positive history of excessive self-control	470 (47.7)	231 (46.7)	239 (48.8)
Fecal incontinence once a week or more	213 (21.6)	84 (17.0)	129 (26.3)

^aValues are expressed as No. (%).

quency of consumed drugs were related to PEG (n=586; 60%) and metoclopramide (n = 3; 0.3%), respectively. In addition, the most common diagnostic measure was the performance of Complete Blood Count (CBC). Considering the children's history, 529 (53.6%), 9 (0.9%), and 35 cases (3.5%) had suffered from jaundice, sepsis, and respiratory disorders, respectively, during their neonatal period. During infancy, also, 207 (21.1%), 23 (2.3%), and 82 children (8.4%) had experienced diarrhea and vomiting, respiratory disorders, and other diseases, respectively. Furthermore, 738 children (74.8%) were breastfed 92.7% of whom were exclusively breastfed up to the age of 6 months (Table 4). Moreover, 163 (16.6%), 90 (9.2%), 165 (16.8%), and 565 (57.5%) children consumed vegetables every day, three times a week, once a week, and rarely, respectively. Also, 34 (3.5%), 194 (19.8%), 280 (28.5%), and 474 (48.3%) children consumed grains every day, three times a week, once a week, and rarely, respectively.

The mean of daily physical activity was 2.3 + 3.6 hours (Table 5). Indeed, the mean of watching TV and using computer games was 5.9 + 5.1 hours and 1.5 + 3.6 hours, respectively. Accordingly, 371 (37.6%), 81 (8.2%), and 535 (54.2%) chil-

Table 3. The Signs and Symptoms Reported Among the Children^a

Variables	Total	Female	Male
History of anorexia	690 (70.0)	337 (68.2)	353 (71.7)
History of streaks of blood on the stool	179 (18.1)	88 (17.8)	91 (18.5)
History of sheep dung stool	848 (85.9)	435 (87.9)	413 (83.9)
History of abdominal pain	778 (78.8)	397 (80.2)	381 (77.4)
History of rectal bleeding	463 (47.0)	250 (50.6)	213 (43.4)
History of anal itching	444 (45.2)	239 (48.5)	205 (41.9)

^aValues are expressed as No. (%).**Table 4.** Children's Nutritional Style During Infancy^a

Variables	Mo ^a	No. (%)
Female		
Breast milk	20.4 ± 7.0	372 (75.2)
Milk powder	20.1 ± 5.8	95 (19.2)
Breast milk and milk powder	20.6 ± 7.0	84 (17.0)
Cow milk	11.8 ± 4.8	6 (1.3)
Male		
Variables	Mo	
Breast milk	20.2 ± 6.8	366 (74.5)
Milk powder	19.6 ± 6.9	101 (20.6)
Breast milk and milk powder	20.9 ± 6.3	78 (15.9)
Cow milk	7.2 ± 5.5	5 (1.1)

^aValues are expressed as mean ± SD.

dren watched TV for less than 2 hours, 2-3 hours, and more than 3 hours a day, respectively. Also, 815 (82.6%), 35 (3.5%), and 137 (13.9%) children used computer games for less than 2 hours, 2 - 3 hours, and more than 3 hours a day, respectively. Furthermore, having constipation for more than six months was associated with the age of onset of constipation less than two years (P = 0.003). Watching television was reported in 600 (69.7%) children with more than six months constipation (P < 0.001) (Table 6).

Table 5. Physical Activity in the Children with Constipation

	No. (%)
< 1 (hours/day)	707 (71.6)
1 - 2	65 (6.6)
> 2	215 (21.8)

Table 6. Relationship of the Age of the Onset of Constipation Less Than Two Years and Watching TV with Constipation for More Than 6 Months

Variables	Constipation for More Than 6 Months		P Value
	Yes	No	
age of onset of Constipation less than two years	Yes	544 (63.2)	0.003
	No	317 (36.8)	
Watching TV	Yes	600 (69.7)	< 0.001
	No	261 (30.3)	

4. Discussion

This descriptive study was carried out to assess the demographic, clinical, dietary, and other effective factors in chronic functional constipation. The mean age of the constipated children in our study was 4.8 years, which was comparable with the results of other studies (10, 11). However, the children's mean age was higher in the studies performed by Inan et al. (12) and Faleiros et al. (13). Additionally, the male/female ratio was 1:1.01 in the present study. This measure was also reported to be 1:1.24, 1.86:1, and 2.03:1 in the studies by Iacono et al. (14), Benninga et al. (15), and Youssef et al. (16), respectively. Moreover, approximately 1.3% of the current study cases had an organic pathology, with the highest frequency being related to cerebral palsy. Aydogdu et al. also estimated the frequency of organic constipation to be 7.7%, with the highest frequency being related to Hirschsprung's disease (17). The lower rate of organic constipation in the current study might be attributed to a referral bias (prolonged non-response bias) rather than a different epidemiology in the study (18).

Considering the parents' education levels, the highest frequency was related to high school education [559 fathers (56.8%) and 527 mothers (53.4%)], which is in agreement with the results obtained by Buonavolonta et al. Besides, only 161 mothers (16.3%) were employed in our study, while this measure was higher in the study by Buonavolonta et al. In addition, most of the families under our investigation had only one child, which is in contrast to the results of the research by Buonavolonta et al. (19).

Adults with lower socioeconomic and education levels had higher rates of constipation (20). Nonetheless, studies conducted on children have revealed no significant relationships between the rate of constipation and parents' education level, mother's employment status, and family size (12). The difference between children and adults regarding the pathophysiology of constipation justifies the difference in the risk factors. Since the main mechanism of constipation among children is a vicious cycle resulting from voluntary fecal retention, environmental factors that can potentially delay defecation might play a role in the in-

cidence of constipation among children (20).

In the current study, the children's mean age at the beginning of constipation was 1.8 ± 2.1 years, which is lower compared to the study by Chang et al. (11). The children's mean age at the beginning of toilet training was 1.9 ± 0.5 years in our study, which is lower in comparison with the research by Borowitz et al. (21). In addition, the median interval between defecations was 2 days. According to the study by Guimaraes et al., the mean stool frequency was 1.9 ± 0.2 times/week, with the median of 1.8 times/week (22).

In the present study, a small percentage of the cases used toilets at school, which might be an outcome of or a reason for constipation (12). Evidence has indicated that not using toilets at school despite the urge for bowel movements could be an independent risk factor for constipation among children. In fact, preventing bowel movements transfer during long school hours could increase the risk of constipation through continuous fecal retention. Furthermore, previous studies have demonstrated no significant differences between the children with and without constipation regarding cleanliness and facilities of school toilets. Compared to the cleanliness of toilets, children's feeling about using toilets at school plays a far more important role in constipation. Teachers' attitude, children's personality, and peers' reactions could affect children's utilization of school toilets, as well. Thus, general education for the promotion of positive attitude towards using school toilets can be effective in reduction of the incidence of severe and chronic constipation among children (20).

In our study, family history of constipation was reported in 479 patients (48.5%), 63.2% of whom were related to the first-degree relatives. Indeed, family history of constipation (0 - 20 years of age) was 60.5% in the study by Chan et al. (23), 38% in the study by Benninga et al. (15), 30.5% in the one performed by Aydogdu et al. (17), and 62.5% in the one by Roma et al. Generally, the positive family history has been mentioned as a critical risk factor in various studies, which can be associated with the genetic background of constipation in the patient's family, eating and behavioral habits, toilet training methods, and family's mental status (24).

The results of the present study showed that the rate of fecal incontinence was 21.6%, which was more common among boys. This rate was also obtained as 87% and 22.7% in the studies conducted by Benninga et al. (15) and Roma et al. (24), respectively. In the same line, Pashankar et al. (25) reported this rate to be 46%, which was higher among boys. Indeed, most children reported fecal mass in the rectum, which reflects long-term constipation in this group (20).

In the current study, the history of abdominal pain and painful defecation was reported by 78.8% and 60.7% of the children, respectively. These factors might lead to the impaired quality of life. The frequency of these findings was respectively 38.03% and 78.43% in the study by Roma et al. (24). Youssef et al. also detected these findings in 89% of children (16). Functional constipation mainly results from painful bowel movements in children who avoid defecation due to their unpleasant feelings. Toilet training, change in lifestyle, experiencing stressful events, lack of access to a toilet, and delaying defecation due to being busy could lead to a painful defecation. These factors could also result in the long-term cessation of feces in the colon, reabsorption of liquids, and increase in size and hardness of feces (26). Hence, constipation should be considered as a differential diagnosis in all children suffering from abdominal pain (27).

The frequency of positive history of withholding behaviors was 47.7% in our study, but 97% in the research by Loening-Baucke (28). In the present study, the highest and the lowest frequency of used drugs were related to PEG and metoclopramide, respectively. According to the study by change et al. the most commonly prescribed drugs were osmotic laxatives, such as lactulose (94%) and PEG (63%). Based on the previous studies, lactulose and PEG are drugs of choice for pediatric constipation. Yet, most physicians first try to train individuals to drink more water and only 19% prescribe medications. In the present study, however, the majority of children had received drugs prior to referral. It should be noted that patients with failed drug treatments have longer treatment periods (11).

In our study, a large percentage of the infants were breastfed. In the studies conducted by Turco et al. (29) and Iacono et al. (14), 61.1% and 53.8% of the infants were breastfed, respectively. In our study, a large percentage of the patients rarely consumed vegetables and grains during the week. The study by Sujatha et al. also revealed that children with constipation had low vegetable consumption (30).

Insoluble fiber increases feces weight and decreases colon transit time. Indeed, fiber helps the maintenance of water in the colon, resulting in the creation of softer feces and easier defecation (31). It seems that fiber leads to osmotic and mechanical stimulations required for natural

colon stimulation. Researchers have also mentioned an increase in short-lived fatty acids and production of gas and fluorobacteria as the mechanisms of action (20). Overall, although low fiber consumption might not be considered as a factor in the onset of constipation in all cases, it is one of the main causes of continuation of this disorder (24).

The mean of daily physical activity was 2.3 ± 3.6 hours in our study, but 1.1 ± 0.8 hours in the research by Jennings et al. Up to now, controversial results have been obtained regarding the impact of physical activity on constipation. Few studies have supported the effect of physical activity on the reduction of constipation. On the other hand, some studies have indicated that exercising had no therapeutic effects on constipation. This might be due to gastrointestinal system's blood flow. In fact, exercising might inhibit gastrointestinal function by directing blood flow towards the involved muscles and skin (8).

One of the strong points of this study was its population-based design, its relatively large sample size, and assessment of functional constipation symptoms using Rome III criteria. However, one of the main limitations of this study was the lack of healthy controls for comparison. In addition, all patients were referred to a special clinic, which increases the probability of more resistant patients compared to those referring to a primary care center. This results in the higher prevalence of problems. Moreover, factors such as socioeconomic status, iron consumption, and water consumption throughout the day were not taken into account in this study. Therefore, further studies considering the above-mentioned factors and with a control group are recommended on the issue.

In summary, more than 40% of the cases who were referred to the pediatric GI clinic were suffering from constipation. Furthermore, due to the increasing interest in video games, dramatic reduction of physical activity in our children and their obvious hazardous effects, health authorities are obliged to provide a remedy in this problem.

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