The patterns of weight gain, body mass index and appetite changes in children therapeutically managed for functional constipation

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Abstract

Introduction: Constipation is one of the most common gastroenterological disorders worldwide, especially in developing countries. The knowledge toward the influences of constipation on weight-gain and normal growth is inadequate among families and pediatricians. In present study, we aimed to assess weigh-gain pattern in children with constipation during six months of routine therapy.

Materials and methods: In this analytical study, our population constituted all the children with age of 1-15 years old admitted to the Gastroenterology section of Children Hospital of Zahedan city during 2015-2017. The constipation diagnosis was based on less than three defecations per week persisting for at least one month. Demographic and growth parameters including height, weight, and BMI, and appetite were recorded for each subject following three months of routine treatment.

Results: The mean age of patients under study was 5.67 ± 3.03 years old, and the mean of height was 108.47 ± 19.18 cm. The mean weight and BMI of the children were significantly higher at three months following treatment compared to baseline, however, there was no significant change in neither weight nor BMI regarding individual genders. Appetite improvement was recorded in 60 (57.1%) and 77 (73.3%) of the children at one and three months after treatment, respectively.

Conclusion: Therapeutic intervention in children with constipation can effectively improve weight-gain their pattern and appetite.

Keywords: Constipation, Body mass index, Appetite, Children

Introduction

Constipation is one of the most common gastroenterological disorders worldwide, especially in developing countries. The frequency of constipation in pediatrics is

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around 0.3-13% (1-4). This frequency has been even higher in children with chronic disorders reaching as high as 46% (4). The diagnosis of constipation is based on difficulties in defecation with less than three occasions per week persisting for at least two weeks (5). In particular, pediatric constipation can be associated with hard times for children, families and physicians. Abdominal pain due to stool retention may be the sole drastic feature of constipation (6), however, this may further be complicated by nausea and even bleeding episodes in some patients. These physical problems can further lead to some psychological issues in affected children. In fact, such children may be isolated from their peers in school and playgrounds (7, 8). Despite that many of children with constipation seek domestic and outpatient remedies, the disease still imposes high costs on health care system with total estimated cost of 79.5 million for management of children with constipation (1, 9). Furthermore, childhood constipation significantly affects the quality of life of the affected children and their families (8, 10).

Multiple factors have been proposed as possible contributing factors in pediatric constipation. Although some have proposed the "age" as a predisposing factor, persisting of constipation during late childhood and also adulthood recoils this hypothesis. Accordingly, it has been reported that pediatric constipation can persist in one-third of the affected individuals in older ages. Some also have noted a possibility for familial inheritance of constipation. Relapsed disease has been encountered in as high as half of children with constipation who have been successfully recovered by therapeutic interventions within 5 years (11, 12).

Constipation in children can be a serious cause for growth failure and inappropriate weight gaining through childhood. The knowledge toward the influences of constipation on weight-gain and normal growth is inadequate among families and pediatricians. In present study, we aimed to assess weigh-gain pattern in children with constipation during six months of routine therapy.

Material and methods

Patients: In this analytical study, our population constituted all the children with age of 1-15 years old admitted to the Gastroenterology section of Children Hospital of Zahedan city during 2015-2017. Our study was approved by the ethical committee of Zahedan University of Medical sciences.

Sample size: The sample size was calculated with 95% confidence interval using below formula:

$$n = \frac{Z^2_{1-\alpha/2}\ (p)(p-1)}{d^2}$$

With, $Z_{1-\alpha/2}$ = 1.96, P=0.78, and d= 0.06, the sample size was calculated as 103 which was finally rounded up to 105.

All children with reflux disease, inflammatory bowel disease, hepatic and renal failure, endocrinopathies, and celiac disease were excluded. Also, critically ill patients with systemic manifestation of inflammation were not included.

Diagnosis of constipation: All children with the complaint of anorexia as the main finding were asked to fill a questionnaire addressing the diagnosis of functional constipation. The constipation diagnosis was based on less than three defecations per week persisting for at least one month (4). The children were undergone standard therapy for the condition. The therapy course was followed up by the researcher for three months.

Assessment for growth status and appetite: Demographic and growth parameters including height, weight, and BMI were recorded for each subject. Using

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a three-day dietary questionnaire, the appetite was asked at the admission and at the end of study. Increased appetite was considered as significant increase in daily food intake of at least >20% in volume of major meals (7).

Statistical analysis

Statistical analysis was performed in SPSS 21. Means of age, weight, height, and BMI, as well as frequencies of genders and other qualitative variables were described. Comparisons of the mean of intended variables were made using paired sample student t-test, Mac-Neymar test.

Results

A total of 105 children diagnosed with constipation were assessed regarding weight and appetite alternations one and three months following standard treatment. At the beginning, all the children had anorexia. Females constituted 48 (45.7%) of the participants. The mean age was 5.67± 3.03 years old, and the mean of height was 108.47 ± 19.18 cm.

The mean weight and BMI of the children were significantly higher at three months following treatment compared to baseline, however, there was no significant change in neither weight nor BMI regarding individual genders (Table1). Appetite improvement was recorded in 60 (57.1%) and 77 (73.3%) of the children at one and three months after treatment respectively (Table 2).

Table 1. Weight and body mass index changes in 105 children with constipation at one and three months following routine treatment.

Variables	At the admission	One month after treatment	Three months after treatment	P **value**
Overall Weight (kg)	18.40±8.02	18.73±9.02	19.31±8.9	<0.0001
Male Wight (kg)	18.35±4.29	18.04±6.57	18.63±6.55	0.39
Female Wight (kg)	17.45±5.29	19.55±11.29	20.11±11.24	0.40
BMI (kg/m^2)	14.96±1.29	15.23±2.12	15.74±2.17	<0.0001

Data are shown as mean ± SD**.** BMI; body mass index.

Table 2. Appetite status in children with constipation one and three months following treatment.

Appetite status	Appetite improvement		P value
	Yes	No	
One month after treatment	60 (57.1%)	45 (42.9%)	0.005*
Three months after treatment	77 (73.3%)	28 (26.7%)	

*McNamara's test.

Discussion

Children with FC are usually affected with this condition within the first year of their life. Difficulties in defecation is commonly associated with pain as the most characteristic feature. Rome criteria have been traditionally recruited to diagnose constipation in children of 6-48 months (13). Anatomical studies usually reveal no gastrointestinal structural abnormalities in children with constipation. Actually, etiological and pathophysiological aspects of constipation in children follow a multifactorial pattern with many unknown dimensions. Nevertheless, the effects of constipation on weight gain and childhood growth are serious concerns interfering with normal development of affected children (14). In present study, a prospective cross-sectional study was performed to monitor weight-gain pattern of children with constipation who underwent routine interventions.

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We observed significant improvement in the weight, BMI, and appetite status of children following three months of manage mental intervention. Accordingly, children with constipation asserted improvements in appetite following 12 weeks of routine treatment which was correlated with increased BMI, weight, appetite and other growth parameters (7). Higher body weight has been suggested as an independent risk factor for childhood constipation, especially when accompanying with other chronic disorders (OR, 1.08; 95% CI, 1.03-1.13) (4). In contrast to this, the frequencies of constipation in normal, over-weight and obese children were 14.9%, 13.1%, and 12.9% which suggested no significant association between constipation and body weight (3). This was also supported by the report of Jong et al who stated that exaggerated weight-gain was not a risk factor for childhood constipation (15). However, an established etiological relationship may not be warranted between body weight and childhood constipation.

We here did not encounter a significant deviation in changes in body-weight, BMI, or appetite regarding different genders. In parallel, in other studies in children with constipation, there were no significant differences in gender distribution of the patients regarding weigh gain patterns (4, 11). Furthermore, there was no significant difference in the frequency of constipation in female and male children in current study and different ages. In comparison, constipation was reported to be more likely to be observed in younger children in both boys and girls (2). In line and in a study on 538 children with FC, the median age of childhood constipation was reported as 2.3 years old in a study by Malowitz representing toddlers as the most susceptible age group for development of constipation (13). Nevertheless, relying on only bowel movement intervals may not be an authentic diagnostic feature for very young children and may lead to underestimate the constipation frequency. On of major risk factors that may predispose to constipation within first 24 months of life has been introducing cow's milk within the first 12 months of life (5). An association between constipation and demographic features of children should be more precisely addressed in large cohort studies.

Conclusion

Constipation in children is a common growth limiting phenomenon. Therapeutic intervention in children with constipation can effective improve weight-gain pattern in these children. Appetite, as a major influencing factor, was also improved following three months of therapeutic intervention.

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