

# The relationship between functional constipation with short stature

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## Abstract

This study aimed to determine the relationship between functional constipation with short stature. The cross sectional study was conducted on 134 students of 054870 Tanjung Jati Elementary School, Binjai sub-District, Langkat District in June 2019. Subjects were children between six until twelve years old who met the inclusion and exclusion criterias. Interview was carried out to establish the diagnosis of functional constipation. Short stature was determined based on anthropometric measurements. From 134 samples, there were 10 subjects suffering from functional constipation experiencing short stature and 26 subjects suffering from functional constipation did not experience short stature. There is no significant relationship between functional constipation and short stature ( $p=0.66$ )

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## Introduction

Constipation is a common gastrointestinal problem in children. The prevalence of childhood constipation in the world ranges from 0.7 to 29.6% (Mugie et al., 2011). In the United States about 3% children come to pediatricians with constipation, and 10-25% of these patients are consulted to the pediatric gastroenterology department for evaluation and management (van den Berg et al., 2006). Constipation is a delay or difficulty in defecation that occur for at least two weeks. Based on pathophysiology, constipation is classified into functional and organic constipation. Functional constipation is the most frequent type (Ranuh et al., 2016). It is not linked to mortality directly, but functional constipation leads to poor health-related quality of life (Rajindrajith et al., 2016). A long-term study found 25% children with functional constipation continued to experience symptoms at adult age (Bongers et al., 2010). A 10-year follow-up study found almost 50% of patients presenting with constipation during childhood remained constipated on long-term follow-up (Michaud et al., 2009). Functional constipation can affect the nutritional and growth status in children (Pawlowska et al., 2018).

Growth and development are the important aspects for children's health. One of the growth problems is short stature. The United Nations Children's Fund (UNICEF) in a collaborative project with the World

Health Organization (WHO) and the World Bank Group stated that 159 million children under the age of five years old were still categorized as short stature in 2014 (UNICEF, 2015). Short stature is defined as growth below two standard deviations or the third percentile on a growth chart that matches age and sex (Batubara et al., 2018). There are four districts in North Sumatera with the highest short stature prevalence, one of which is Langkat District, with a prevalence of 55.48% in 2013 and decreased to 23.3% in 2018 (Tim Nasional Percepatan Penanggulangan Kemiskinan, 2017).

Pawlowska et al. (2018) found patients with functional constipation had shorter stature than patients with irritable bowel syndrome and functional abdominal pain. Chao et al. (2008) also found chronic childhood constipation causing growth problem. In that study children with constipation were significantly shorter than their healthy controls. This study showed malnutrition as a cause of growth disturbance in children with constipation. Constipation affects nutritional status because fecal impaction and stool mass in the rectum weaken the appetite due to abdominal discomfort, fullness, and nausea. Growth deficits and weight loss in children with constipation can be caused by low intake of protein, energy and minerals (Pawlowska et al., 2018; Chao et al., 2008).

There is a few research on growth status in children with non-organic disorders, such as functional constipation. Functional constipation can affect the child nutritional and growth status because of its complex etiology, including biological and psychological factors (Pawlowska et al., 2018). Therefore, research on the relationship between constipation and short stature is needed.

## 1. Methods

### 1.1. Subjects and Methods

This was a cross sectional study to examine the relationship between functional constipation and short stature. This study was conducted in among 134 students of 054870 Tanjung Jati Elementary School, Binjai sub-District, Langkat District in June 2019. The target population in this study was children between six until twelve years old. The sample in this study is the population who met inclusion and exclusion criterias. Inclusion criterias were children between six until twelve years old and parents agree to participate in this study. Exclusion criterias were children with organic disorders that can influence nutritional and growth status like congenital disorders or syndrome, and receive long-term steroid therapy. After the interview, subjects were divided into two groups, functional constipation and did not experience functional constipation, then conducted anthropometric examinations so that it can be seen the relationship of functional constipation with short stature in children. Statistical assessment was performed using the Chi square test.

### 1.2. Research Ethics

This study was approved by the Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara / Haji Adam Malik General Hospital in Medan No: 718/TGL/KEPK FK USU-RSUP HAM/2019.

### 1.3. Statistical Analysis

Data was statistically analyzed using SPSS software version 23.0 (Statistical Package for Social Sciences) for windows. Descriptive statistics were expressed in the form of mean  $\pm$  standard deviation (SD) for normally distributed data and median/range test for the not normally distributed data; while for categorical data they were presented in the form of frequency. Association between variables were performed by chi square test with p value of ( $< 0.05$ ) was considered as a significant difference.

## 2. Results

134 subjects fulfill the inclusion and exclusion criterias. From all the subjects, there were 73 male subjects (54.5%) and 61 female subjects (45.5%). The age of the subjects has a median at 9.5 years with range

6 years. Through anthropometric measurements, the body weight has a median at 24 kg with range 48.4 kg. The mean height of subjects was 128.25 (SD 10.96) cm. Assessment of body weight according to height found 4 subjects (3%) were obesity, 3 subjects (2.2 %) were overweight, 86 subjects (64.2%) were normal and 41 subjects (30.6%) were mild malnutrition. Assessment of height-for-age that those who experienced short stature based on the CDC 2000 curve were 43 subjects (32.1%) and those who did not experience short stature were 91 subjects (67.9%). Thirty six subjects (26.9%) suffered functional constipation based on the criteria of Rome III and 98 subjects (73.1%) did not suffered functional constipation (Table 1).

Table 1 Baseline characteristics (n=134)

Subject characteristics	n = 134
Sex, (n/%)	
Male	73 (54.5)
Female	61 (45.5)
Age, year, (median/range)	9.5 (6)
Weight, kg (median/range)	24.0 (48.4)
Height, cm (mean/SD)	128.25 (10.96)
Nutritional status (n/%)	
Obesity	4 (3)
Overweight	3 (2.2)
Normoweight	86 (64.2)
Mild malnutrition	41 (30.6)
Height/age (n/%)	
Short stature	43 (32.1)
Normoheight	91 (67.9)
Functional constipation (n/%)	
Yes	36 (26.9)
No	98 (73.1)

From 134 subjects of the study, there were 10 students who suffered from functional constipation experiencing short stature. Meanwhile, 26 students suffering from functional gastrointestinal disorders did not experience short stature. There is no significant relationship between functional constipation and short stature ( $p=0.66$ ) (Table 2).

Table 2. Relationship between functional constipation and short stature

	Short stature				Total	PR	P
	Yes		No			95%CI	
	N	%	N	%			
Functional constipation							
Yes	10	27.8	26	72.2	36	0.758	0.66*
No	33	33.7	65	66.3	98	(0.327- 1.757)	

\*Chi square test

### 3. Discussion

Study of Biggs et al. (2006) reported 1/3 of 6-12 years old children experienced functional constipation. In this study, the prevalence of functional constipation was 26.9%. In another study of primary school-age children the highest prevalence of constipation was found in the 8-years old group and decreased with increasing age (Chien et al., 2011). This can be due to the natural course of functional constipation; symptoms can improve with age or the child is treated for constipation, causing a low prevalence of

constipation in adolescents (Koppen et al., 2015). In this study, the median age in the functional constipation group was 9 years old.

From basic health research data in 2018, the proportion of short stature in under 5 years old children in Indonesia was 30.8%. Sumatera Utara was the 14th province in the number of short stature. Langkat was one of the districts in North Sumatra that was focused on handling cases of short stature with a prevalence of 23.3% (Biro Komunikasi dan Pelayanan Masyarakat Kementerian Kesehatan Republik Indonesia, 2018; Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia, 2018). From this study, the prevalence of short stature in primary school-age children was 32.1%.

Short stature is defined as growth below two standard deviations or the third percentile on a growth chart that matches age and sex (Batubara et al., 2018). Study by Pawlowska et al. (2018) showed patients with functional constipation had shorter height than patients with irritable bowel syndrome and functional abdominal pain with prevalence 10.8%. Research in Iran found that children with functional constipation had significant lower body weight and height for age compared to group without functional constipation (Yousefi et al., 2019). Another study by Chao et al. (2008) found that children with constipation had lower mean body weight and height compared to the group without constipation. Children with chronic constipation were at risk of underweight, and the response to treatment showed weight gain. This weight gain was also accompanied by a significant height increase. This treatment response was mediated by improved appetite after the management of constipation. From the analysis of the relationship between growth and change in appetite, it was found that children with improved appetite showed significant increase in body weight and height compared to children whose appetite did not improve. Constipation affects nutritional status because fecal impaction and stool mass in the rectum weaken the appetite due to abdominal discomfort, fullness, and nausea (Pawlowska et al., 2018; Chao et al., 2008). Chronic constipation is one of the most common causes of recurrent abdominal pain in children. Research by Staiano et al. (1994) found abdominal pain in 66% patients with chronic constipation and persisted in 70% children during 1 year follow-up. Other study found that abdominal pain is correlated with improved constipation (Abrahamian et al., 1984).

From this study there was no significant relationship between functional constipation and short stature. There was no difference in mean height between two groups. The different result from previous studies can be caused by differences in the duration of constipation, which the duration of constipation in this study was shorter than other studies. Pawlowska et al. (2018) got mean duration of functional constipation was 39.6 months, whereas in this study the most duration was 2 months. Haapalahti et al. (2004) reported that children with symptoms of constipation for at least 6 months more often did not lunch and avoided food than the control group. But from the assessment of energy and nutrition intake, there was no significant difference. Nutritional status in the two groups also did not differ significantly. While the study by Chao et al. (2008) found a low intake of energy, protein and /or minerals in the functional constipation group had impact on the children nutritional and growth status. In this study there was no assessment of appetite and nutritional intake of children with functional constipation. The shorter duration of constipation compared to previous studies may not have influenced the appetite and nutritional intake, so that the growth status in the two groups did not differ significantly. The same result was also obtained from a study by Deghani et al. (2013) which found no difference in height between the functional constipation and the control groups and height for age in the functional constipation group was also not lower than the control group. In that study the median duration of constipation was 22 months. Pawlowska et al. (2018) estimated that there were psychological influences that affect growth status in children with functional gastrointestinal disorders.

This study had limitations, in which there was no assessment of appetite and psychological problems that can affect the growth status of children with functional constipation. Although in this study there was no relationship between functional constipation and short stature, but the influence of functional constipation on the children growth status still needs to be considered, especially if the duration of constipation is quite long.

#### 4. Conclusion

There is no relationship between functional constipation and short stature in children.

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