

## Obesity and functional constipation in children

Natasha Yuwanita, Atan Baas Sinuhaji, Tiangsa Sembiring, Supriatmo,  
Ade Rachmat Yudianto

### Abstract

**Background** Functional constipation is a common pediatric problem in both developed and developing countries. In the past two decades, the prevalence of obesity has increased worldwide. Obesity itself leads to many health problems, including functional constipation. Studies correlating obesity to functional constipation have thus far mostly originated from developed countries.

**Objective** To assess for a possible correlation between obesity and functional constipation in children in a developing country.

**Methods** This cross-sectional study was conducted in Al-Mukhlisin Islamic Boarding School, Batu Bara District, North Sumatera Province, Indonesia, between July and August 2015. The subjects were 150 students aged 12 to 17 years. Questionnaires were used to determine functional constipation and filled by direct interview. Obesity was determined by body mass index. Data were analyzed using Chi-square test.

**Results** Of 150 children, 49 had functional constipation; and 18 of the 49 were obese. The mean age of children with constipation was 14.7 (SD 1.07) years (95%CI 14.1 to 14.7) and their mean body weight was 53.8 (SD 15.10) kg (95%CI 49.4 to 58.1). The prevalence for functional constipation in obese children was 58%. There was a statistically significant correlation between obesity and functional constipation (prevalence ratio=4; 95%CI 1.72 to 8.94; P=0.001), indicating that obese children had 4 times higher risk of having functional constipation.

**Conclusion** There is a significant correlation between obesity and functional constipation in children. [Paediatr Indones. 2018;58:1-4 ; doi: <http://dx.doi.org/10.14238/pi58.1.2018.1-4> ].

**Keywords:** obesity; functional constipation; prevalence; children; developing country

Functional constipation is one of the most common gastrointestinal problems in children, with around 3% of all pediatric cases. In the past two decades, the obesity prevalence has also increased.<sup>1</sup> Most studies on a correlation between obesity and functional constipation have been done in developed countries.<sup>2</sup> Obese children usually consume a low fiber diet and engage in less physical activity than normoweight children. These two factors result in altered defecation patterns.<sup>3</sup>

A recent pediatric study reported a significantly higher prevalence of obesity in children with functional constipation (23%) compared to a control group.<sup>4</sup> In an effort to increase children's quality of life, we aimed to assess for a possible correlation between obesity and functional constipation.

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This study was presented at the 5<sup>th</sup> Global Congress for Consensus in Pediatrics and Child Health, Xi'an, China, March 3-6, 2016.

From the Department of Child Health, University of Sumatera Utara Medical School/Haji Adam Malik General Hospital, Medan, North Sumatera, Indonesia.

**Reprint requests to:** dr. Natasha Yuwanita, Department of Child Health, University of Sumatera Utara Medical School/H. Adam Malik Hospital, Jl. Bunga Lau No. 17, Medan 20138, North Sumatera, Indonesia. Telp. (061) 8361721 – 836663; Fax. (061) 836172; Email: [natasha.yuwanita@gmail.com](mailto:natasha.yuwanita@gmail.com).

## Methods

This cross-sectional study was done to examine a potential correlation between obesity and functional constipation in children aged 12 to 17 years. Participants were recruited by consecutive sampling from the Al-Mukhlisin Boarding School at Batu Bara District, North Sumatra Province from July to August 2015.

Subjects were generally healthy at the time of investigation and had no chronic or acute illnesses. Children were excluded if they were malnourished or overweight, had gastrointestinal or endocrine disorders, diarrhea, vomiting, fever, failure to thrive, blood in the stool, or organic abnormalities. This study was approved by the Ethics Committee for Research, University of Sumatera Utara Medical School. Subjects were included after obtaining informed consent from their parents or guardians.

The subjects were surveyed by questionnaire and direct interview to assess the incidence of functional constipation, based on ROME III criteria. The criteria consisted of two or fewer defecations in the toilet per week, at least one episode of fecal incontinence per week, history of retentive posturing or excessive volitional stool retention, history of painful or hard bowel movements, presence of a large fecal mass in the rectum, and history of large diameter stools which may obstruct the toilet. A diagnosis of functional constipation was made when these criteria were fulfilled at least two of them, once per week, for at least 2 months prior to diagnosis.

All participants underwent physical examinations performed by a physician. Body height (BH) was measured to the nearest 0.5 cm using a portable stadiometer (*Microtoa 2 M*). Body weight (BW) was measured on a *Camry Scale* with a precision of 0.5 kg. The children were weighed without shoes and wearing

light clothing. All measurements were taken twice and repeated a third time if the first two measurements differed by more than 0.5 cm for BH or 0.5 kg for BW. Body mass index (BMI) was calculated as BW in kilograms divided by BH in meters squared. These measurements compared to the 2000 Centers for Disease Control and Prevention (CDC) growth chart of BMI for children aged 2 to 20 years.<sup>2</sup> Subjects with BMI  $\geq$  95<sup>th</sup> percentile were classified as obese; those with BMI between 5<sup>th</sup> percentile and < 85<sup>th</sup> percentile were classified as normoweight children.

Data were processed and analyzed using SPSS version 17.0 software, and presented in text and tables. The correlation between obesity and functional constipation was analyzed using Chi-square test. A P value of < 0.05 was considered to be statistically significant, with 95% confidence interval (95% CI).

## Results

From a total of 200 students at the school, 45 children's parents refused to provide informed consent, leaving 155 children who underwent body weight and height measurements. Of these, 5 children were excluded because they were overweight (BMI between the 85<sup>th</sup> and 95<sup>th</sup> percentile). Hence, 150 subjects were either normal weight or obese. We divided subjects into two groups, with and without functional constipation. Subject's characteristics are shown in **Table 1**.

We assessed for a relationship between sex and functional constipation in our study. Chi-square test revealed no significant relationship between sex and functional constipation ( $P > 0.05$ ) (**Table 2**). However, Chi-square test revealed a significant relationship between obesity and functional constipation ( $P = 0.0001$ ) (**Table 3**).

**Table 1.** Subjects' characteristics

Variables	Functional constipation			
	Yes (n= 49)		No (n= 101)	
	Mean (SD)	95%CI	Mean (SD)	95%CI
Age, years	14.7 (1.04)	14.1 to 14.7	14.2 (1.00)	14.0 to 14.4
Body weight, kg	53.8 (15.10)	49.4 to 58.1	44.1(10.20)	42 to 46.1
Body height, cm	144.3 (7.20)	142 to 147.2	148.8 (7.50)	146.7 to 151
BMI, kg/m <sup>2</sup>	23.5 (6.30)	21.7 to 25.3	20.7 (4.20)	19.8 to 21.6

**Table 2.** The relationship between sex and functional constipation

Variables	Functional constipation		P value
	Yes (n=49)	No (n=101)	
Male, n(%)	22 (35)	41 (65)	0.616*
Female, n(%)	27 (31)	60 (69)	

\*Chi-square test

a risk factor for functional constipation.<sup>9</sup> Also in contrast to our results, a US study found that girls had 3 times higher risk of functional constipation than boys.<sup>10</sup> However, another US study concluded that gender was not a risk factor for functional constipation in children.<sup>11</sup>

**Table 3.** The correlation between obesity and functional constipation

Variables	Functional constipation		Prevalence ratio (95%CI)	P value
	Yes (n= 49)	No (n= 101)		
Obese, n(%)	18 (58)	13 (42)	4 (1.72 to 8.94)	0.001*
Normoweight, n(%)	31 (26)	88 (74)		

\*Chi-square test

## Discussion

In our study, the prevalence of functional constipation was 32.6%. Subjects with functional constipation had a mean age of 14.7 years. The prevalence of obese children with constipation was 58%. The prevalence of functional constipation worldwide was reported to range from 0.7 to 29.6%.<sup>5</sup> Loening-Baucke found that 22.6% of 482 children had functional constipation, and ranged in age from 4 to 17 years. Children under 1 year of age were excluded because their may be a greater likelihood of organic causes in children this young.<sup>5</sup>

In subjects with functional constipation, mean body weight and mean body height were 53.8 kg and 144.3 cm, respectively. The mean BMIs in children with and without constipation were 23.5 kg/m<sup>2</sup> (above 75<sup>th</sup> percentile) and 20.7 kg/m<sup>2</sup> (below 50<sup>th</sup> percentile), respectively. These results showed that children with functional constipation had higher BMI. Although BMI depends on race and gender, it remains the best tool to assess percentage of fat and the association between body weight and body height.<sup>6,7</sup> *The American Academy of Pediatrics* (AAP) recommends BMI monitoring to prevent obesity in children and adolescents.<sup>8</sup>

We found no significant association between biological sex and functional constipation. On the contrary, using the *Constipation Risk Assessment Scale*, a score of 2 for girls indicated that being female was

In our study, we found a significant correlation between obesity and functional constipation, with prevalence ratio of 4, indicating that obese children had four times higher risk of functional constipation compared to normoweight children. This result was similar to that of a retrospective study in the US in 2006 that showed 41% of obese children had functional constipation.<sup>12</sup> Furthermore, another study in 2004 explained that hormonal changes or hyperglycemia may have important roles in functional constipation on obese children.<sup>4</sup>

To assess all risk factors for functional constipation, univariate and multivariate analyses are needed. We used only Chi-square test in this cross-sectional study. As such, our preliminary data can be used as a basis for further study to evaluate other risk factors for functional constipation. Another limitation of this study was not using random sampling to choose subjects, hence, there may have been some bias.

In conclusion, obese children have four times higher risk of functional constipation than normoweight children. The prevalence for functional constipation in obese children in our study was 58%. We also observed no association between gender and functional constipation in children. Additional studies are required to identify other risk factors, such as eating patterns and binge eating, in order to improve our understanding of the mechanisms involved in functional constipation.

## Conflict of Interest

None declared.

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