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Prevalence of overweight and obesity in children with functional constipation aged 6 to 12 years attending outpatient department in a tertiary care hospital at Tamil Nadu, India

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ABSTRACT

Background: Functional constipation and obesity negatively impact children in several aspects. Objective was to find the prevalence of overweight and obesity in children with functional constipation in the age group of 6 to 12 years **Methods:** This cross-sectional study was done at the outpatient department of the Department of Pediatrics and Department of Surgery at Arunai Medical College and Hospital, Thiruvannamalai, Tamilnadu, India among 186 children with functional constipation aged 6 to 12 years. Data was collected from the parents and children using a predesigned questionnaire and clinical examination done. Data collected were analyzed by suitable statistical methods.

Results: Out of the 186 children with functional constipation studied, 76 (40.86%) had normal BMI, 66 (35.48%) were overweight and 44 (23.66%) were obese. Of the 66 overweight children with functional constipation, 50% are male and 50% are female. Of the 44 obese children with functional constipation, 63.64% were male and 36.36% were female. A statistically higher prevalence of overweight (63.79%) and obesity (25.87%) was observed in children with functional constipation in the age group of 11 to 12 years. There was no statistically significant correlation of gender and socioeconomic status with body mass index (BMI) in children with functional constipation. A higher prevalence of overweight (57.45%) was observed in children with functional constipation with a predominantly non vegetarian diet. 46.77% of children with functional constipation experienced encopresis. The percentage of children with encopresis was significantly higher in the obese group (88.64%) compared to overweight children (57.58%) and children with normal BMI (13.16%).

Conclusions: There is a high prevalence of overweight and obesity in children with functional constipation aged 6 to 12 years.

Keywords: Functional constipation obesity, Functional constipation overweight, Functional constipation children, Functional constipation children

INTRODUCTION

There has been a tenfold increase in the prevalence of obesity among children and adolescents over the past 40 years. Overweight and obesity has been linked to several

functional gastrointestinal disorders. Functional constipation is a common childhood functional gastrointestinal disorder with a mean prevalence of 14% in chidren.² Functional constipation as well as obesity negatively impacts children in several aspects. In our

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study we aim to find the prevalence of overweight and obesity in children aged 6 to 12 years presenting with functional constipation.

Objective

Objective was to find the prevalence of overweight and obesity in children with functional constipation in the age group of 6 to 12 years.

METHODS

This was a cross sectional study done at the outpatient department of the Department of Pediatrics and Department of Surgery at Arunai Medical College and Hospital, Thiruvannamalai, Tamilnadu, India. The study was conducted over a duration of one year from October 2019 to September 2020 among 186 children with functional constipation aged 6 to 12 years. Children presenting to the outpatient department with complaint of constipation were evaluated and children fitting into the diagnosis of functional constipation as per Rome IV criteria.² (Table 1) were included in the study.

Table 1: Diagnostic criteria for functional constipation (Rome IV).

Must include 2 or more of the following occurring at least once per week for a minimum of 1 month with insufficient criteria for a diagnosis of irritable bowel syndrome

- 2 or fewer defecations in the toilet per week in a child of a developmental age of at least 4 years
- 2 At least 1 episode of fecal incontinence per week
- 3 History of retentive posturing or excessive volitional stool retention
- 4 History of painful or hard bowel movements
- 5 Presence of a large fecal mass in the rectum
- 6 History of large diameter stools that can obstruct the toilet

After appropriate evaluation, the symptoms cannot be fully explained by another medical condition.

Inclusion criteria

The study were children with functional constipation as per Rome IV criteria in the age group of 6 to 12 years whose parents were willing to participate in the study.

Exclusion criteria

The study were children with organic causes of constipation, children with potential alarm features of constipation (Table 2), children with pathological causes of overweight and obesity, children with chronic illness, children on long term medications, children with psychiatric disorders, children who are underweight, children with severe thinness as per sex specific IAP BMI

charts 2015, children under treatment for constipation and parents who were not willing to participate in the study.

Table 2: Potential alarm features of constipation.

Passage of meconium >48 h in a term new-born
Constipation starting in the first month of life
Family history of Hirschsprung's disease
Ribbon stools
Blood in the stools in the absence of anal fissures
Failure to thrive
Bilious vomiting
Severe abdominal distension
Abnormal thyroid gland
Abnormal position of the anus
Absent anal or cremasteric reflex
Decreased lower extremity strength/tone/reflex
Sacral dimple
Tuft of hair on spine
Gluteal cleft deviation
Anal scars

After obtaining informed consent from parents, demographic details, history including constipation symptoms and dietary habits were collected from the parents and children using a predesigned questionnaire. Detailed clinical examination was done investigations done in indicated patients to rule out organic causes of constipation and for evaluation of overweight or obesity. The height of the children was measured by a stadiometer and the weight by digital weighing scale. The BMI was calculated using the formula weight(kg)/height(m²) and plotted in sex specific IAP BMI charts 2015 for boys (Figure 1) or girls (Figure 2). Based on BMI, children were classified as thinness (less than 3rd percentile), normal BMI, overweight and obese.

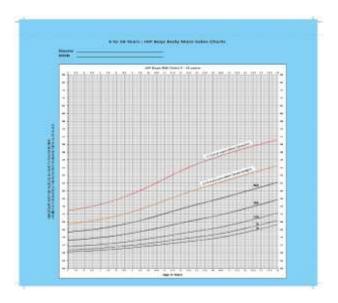


Figure 1: IAP BMI chart 5 to 18 years (boys).

Data collected were analyzed by suitable statistical methods using SSPS 25 software. Statistical significance was assessed at 5% level of significance (p value<0.05).

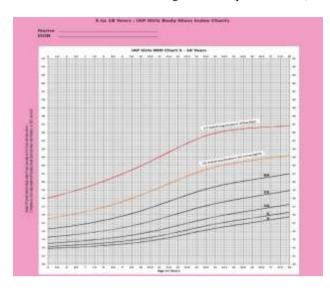


Figure 2: IAP BMI chart 5 to 18 years (girls).

RESULTS

A total of 186 children were studied of which 101 (54.30%) were male and 85 (45.70%) were female. Of the 186 children, 78 (41.94%) were in the age group of 6 to 8 years, 50 (26.88%) in the age group of 9 to 10 years and 58 (31.18%) in the age group of 11 to 12 years.

As per Modified Kuppusamy's socio economic status scale, 13.98% belonged to class I (upper), 30.10% were class II (upper middle), 36.57% were class III (middle), 12.90% belonged to class IV (upper lower) and 6.45% belonged to class V (lower). The demographic distribution as per the participant's gender, age and socioeconomic status is shown in Table 3.

Table 3: Demographic profile of the children (Based on gender, age and socioeconomic status).

Demographic profile	N (%)
Gender	
Male	101 (54.30)
Female	85 (45.70)
Age group	
6 to 8 years	78 (41.94)
9 to 10 years	50 (26.88)
11 to 12 years	58 (31.18)
Socioeconomic status	
Class I (upper)	26 (13.98)
Class II (upper middle)	56 (30.10)
Class III (middle)	68 (36.57)
Class IV (upper lower)	24 (12.90)
Class V (lower)	12 (6.45)

Out of the 186 children studied, majority (50.54%) followed a mixed diet pattern. 25.27% of the children followed a predominantly non vegetarian diet and 24.19% followed a vegetarian diet (Figure 3).

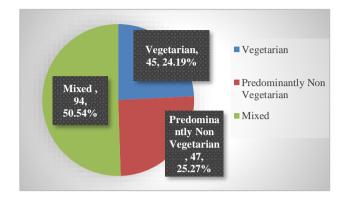


Figure 3: Distribution of children with functional constipation as per dietary pattern.

As shown in Figure 4, of the 186 children with functional constipation studied, 76 (40.86%) had normal BMI, 66 (35.48%) were overweight and 44 (23.66%) were obese.

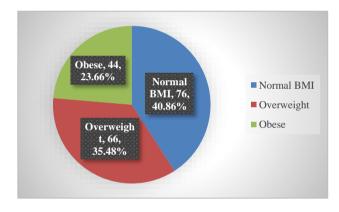


Figure 4: Distribution of children with functional constipation as per BMI.

Table 4: Gender and BMI wise distribution in children with functional constipation.

Gender	Normal BMI (n=76)	Overweight (n=66)	Obese (n=44)
	N (%)	N (%)	N (%)
Male (n=101)	40 (52.63)	33 (50.00)	28 (63.64)
Female (n=85)	36 (47.37)	33 (50.00)	16 (36.36)

The gender and BMI wise distribution among children with functional constipation is shown in Table 4. Of the 66 overweight children with functional constipation, 50% are male and 50% are female. Of the 44 obese children with functional constipation, 63.64% were male and 36.36% were female. There was no statistically significant correlation between gender and BMI in children with functional constipation (p value>0.05).

The age and BMI wise distribution among children with functional constipation is shown in Table 5. A higher prevalence of overweight (63.79%) and obesity (25.87%) was observed in children with functional constipation in the age group of 11 to 12 years and this difference was statistically significant (p value<0.05).

Table 5: Age and BMI wise distribution in children with functional constipation.

Age (in years)	Normal BMI (n=76) N (%)	Overweight (n=66) N (%)	Obese (n=44) N (%)
6 to 8 (n=78)	51 (65.38)	9 (11.54)	18 (23.08)
9 to 10 (n=50)	19 (38.00)	20 (40.00)	11(22.00)
11 to 12 (n=58)	6 (10.34)	37 (63.79)	15 (25.87)

Chi square test $X^2 - 50.9786$, P value ≤ 0.00001 (significant)

The socioeconomic status and BMI wise distribution among children with functional constipation is shown in table 6. There was no statistically significant correlation between socioeconomic status and BMI in children with functional constipation (p value>0.05).

Table 6: Age and BMI wise distribution in children with functional constipation.

Age	Normal BMI (n=76) N (%)	Overweight (n=66) N (%)	Obese (n=44) N (%)
Class I (upper) (n=26)	14 (53.85)	8 (30.77)	4 (15.38)
Class II (upper middle) (n=56)	24 (42.86)	22 (39.28)	10 (17.86)
Class III (middle) (n=68)	28 (41.18)	24 (35.29)	16 (23.53)
Class IV (upper lower) (n=24)	6 (25.00)	6 (25.00)	12 (50.00)
Class V (lower) (n=12)	4 (33.33)	6 (50.00)	2 (16.67)

Chi square test X²–13.4582, p value–0.097027 (not significant)

The dietary pattern and BMI wise distribution among children with functional constipation is shown in Table 7. A higher prevalence of overweight (57.45%) was observed in children with functional constipation with a predominantly non vegetarian diet and this was statistically significant (p value<0.05).

Table 7: Dietary pattern and BMI wise distribution in children with functional constipation.

Dietary pattern	Normal BMI (n=76)	Overweight (n=66)	Obese (n=44)
	N (%)	N (%)	N (%)
Mixed	49	30	15
(n=94)	(52.13)	(31.91)	(15.96)
Vegetarian	20	9	16
(n=45)	(44.44)	(20.00)	(35.56)
Predominantly	7	27	13
non-vegetarian (n=47)	(14.89)	(57.45)	(27.66)

Chi square test X²–25.9522, P value–0.000032 (significant)

Total 46.77% of children with functional constipation experienced encopresis. The percentage of children with encopresis was significantly higher in the obese group (88.64%) compared to overweight children (57.58%) and children with normal BMI (13.16%) (p value < 0.05) as shown in Table 8. The prevalence of obesity in children with functional constipation was significantly higher in children with encopresis (44.83%) compared to children without encopresis (5.05%).

Table 8: Encopresis in children with functional constipation.

Encopresis	Normal BMI (n=76)	Overweight (n=66)	Obese (n=44)
	N (%)	N (%)	N (%)
Present (n=87)	10 (13.16)	38 (57.58)	39 (88.64)
Absent (n=99)	66 (86.84)	28 (42.42)	5 (11.36)

Chi square test X²–68.5622, P value≤0.00001 (significant)

DISCUSSION

A higher prevalence of functional gastrointestinal disorders has been observed in overweight and obese children. Functional gastrointestinal disorders are hypothesized to be a result of an initial inflammatory insult to the gastrointestinal tract that modifies visceral sensitivity and/or motility. It has been suggested that obesity may increase the risk of functional gastrointestinal disorders due to the release of proinflammatory cytokines.³ It was observed in a study by Phatak et al that 47% of the obese/overweight children had at least one functional gastrointestinal disorder compared with 27% of children with normal weight.⁴

Functional constipation is a major childhood functional gastrointestinal disorder. A systematic review of epidemiology of constipation by Mugie et al observed a prevalence rate of constipation in children between 0.7% and 29.6% (median 12%).⁵ This wide range in reported

prevalence may be due to the use of different criterias and cultural influences. Functional constipation is equally common in both sexes and children with diverse socioeconomic backgrounds, dietary practices, and cultural influences.²

The prevalence of overweight (12-33%) and obesity (17-20%) was found to be higher in patients with functional defecation disorders compared with controls in several studies.^{6,7} Out of the 186 children with functional constipation in our study, 76 (40.86%) had normal BMI, 66 (35.48%) were overweight and 44 (23.66%) were obese.

Similar observations were made by Pashankar et al in their study in which prevalence of obesity was significantly higher in constipated children (22.4%) compared with control children (11.7%).⁸ A 44% prevalence of overweight in constipated children was observed in the study by Misra et al.⁹ A statistically significant difference was observed between groups regarding obesity/overweight and constipation in a study by Olaru et al.¹⁰ A lesser incidence of overweight (19.2%), and obesity (6.7%) were observed in children with functional constipation the study by Koppen done at Columbia.¹¹ This lesser incidence is probably due to the regional variation in the prevalence of overweight and obesity.

We found no statistically significant correlation of BMI with gender and socioeconomic status in our study. However, a higher rate of obesity was observed in male constipated children compared to female children in the study by Pashankar.⁸

A higher prevalence of overweight (63.79%) and obesity (25.87%) was observed in children with functional constipation in the age group of 11 to 12 years in our study. This may be due to several nutritional and life style factors in this age group such as increased intake of junk food, increasing screen time, reduced physical activity and sedentary lifestyle leading to increasing BMI.

In our study, a higher prevalence of overweight (57.45%) was observed in children with functional constipation on a predominantly non vegetarian diet. High fat diet, low fiber diet and low water intake have been considered risk factors for constipation. 12-14 Functional constipation is observed to be equally common in children with various dietary practices in several studies.^{2,5} Epidemiological studies indicate that vegetarian diets are linked with lower BMI and lower prevalence of obesity in children.¹² Plant-based diets are low in energy density and high in complex carbohydrate, fiber, and water, which may increase satiety and resting energy expenditure. The higher prevalence of overweight in children with functional constipation with predominantly vegetarian diet in our study could be due to increased calorie intake and lesser intake of plant-based diet in this group. Further studies in a larger group is required to understand the role of dietary pattern in overweight and obesity in children with functional constipation.

Total 46.77% of children with functional constipation experienced encopresis in our study. Encopresis was similarly present in 46% of constipated children in the study by Pashankar et al.⁸ The prevalence of obesity was found to be similar in constipated children with and without encopresis in their study. In contrast in our study the prevalence of obesity in children with functional constipation was significantly higher in children with encopresis (44.83%) compared to children without encopresis (5.05%).

CONCLUSION

Our study shows a higher prevalence of overweight (35.48%) and obesity (23.66%) in children with functional constipation in the age group of 6 to 12 years. This indicates the importance of screening children who are obese and overweight for functional constipation. Further studies among overweight and obese children with functional constipation will help to understand the pathophysiological relationship between the two clinical entities.

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Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Abarca-Gómez L, Abdeen ZA, Hamid ZA, Abu-Rmeileh NM, Acosta-Cazares B, et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128-9 million children, adolescents, and adults. Lanc. 2017;390(10113):2627-42.
- 2. Hyams JS, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Childhood functional gastrointestinal disorders: child/adolescent. Gastroenterol. 2016;150(6):1456-68.
- 3. Pourhoseingholi MA, Kaboli SA, Pourhoseingholi A, Moghimi-Dehkordi B, Safaee A, Mansoori BK, et al. Obesity and functional constipation; a community-based study in Iran. J Gastrointestin Liv Dis. 2009;18(2):151-5.
- 4. Phatak UP, Pashankar DS. Prevalence of functional gastrointestinal disorders in obese and overweight children. Int J Obes. 2014;38(10):1324-7.
- 5. Mugie SM, Benninga MA, Di Lorenzo C. Epidemiology of constipation in children and adults: a systematic review. Bes Prac Resea Clinic Gastroenterol. 2011;25(1):3-18.
- 6. Koppen IJ, Kuizenga-Wessel S, Saps M, Di Lorenzo C, Benninga MA, van Etten–Jamaludin FS, et al.

- Functional defecation disorders and excessive body weight: a systematic review. Pediat. 2016;138(3).
- 7. Tambucci R, Quitadamo P, Ambrosi M, De Angelis P, Angelino G, Stagi S, et al. Association between obesity/overweight and functional gastrointestinal disorders in children. J Pediat Gastroenterol Nutrit. 2019;68(4):517-20.
- 8. Pashankar DS, Loening-Baucke V. Increased prevalence of obesity in children with functional constipation evaluated in an academic medical center. Pediat. 2005;116(3):e377-80.
- 9. Misra S, Lee A, Gensel K. Chronic constipation in overweight children. J Parent Ent Nutrit. 2006;30(2):81-4.
- Olaru C, Diaconescu S, Trandafir L, Gimiga N, Stefanescu G, Ciubotariu G, et al. Some risk factors of chronic functional constipation identified in a pediatric population sample from Romania. Gastroenterol Resear Pract. 2016;2016.
- 11. Koppen IJ, Velasco-Benítez CA, Benninga MA, Di Lorenzo C, Saps M. Is there an association between functional constipation and excessive bodyweight in children?. J Pediat. 2016;171:178-82.

- Karagiozoglou-Lampoudi T, Daskalou E, Agakidis C, Savvidou A, Apostolou A, Vlahavas G. Personalized diet management can optimize compliance to a high-fiber, high-water diet in children with refractory functional constipation. J Acad Nutrit Dietet. 2012;112(5):725-9.
- 13. Macêdo MI, Albuquerque MD, Tahan S, Morais MB. Is there any association between overweight, physical activity, fat and fiber intake with functional constipation in adolescents?. Scandinav J Gastroenterol. 2020;55(4):414-20.
- Fujitani A, Sogo T, Inui A, Kawakubo K. Prevalence of Functional Constipation and Relationship with Dietary Habits in 3-to 8-Year-Old Children in Japan. Gastroenterol Resear Pract. 2018;2018.

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