

Normal Bowel Pattern in Children and Dietary and Other Precipitating Factors in Functional Constipation

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ABSTRACT

Aim: To study the bowel pattern of children in general population and children with habit constipation with respect to food habits and regarding psychosocial aspect of toileting.

Materials and Methods: A prospective descriptive study was done in the Institute of child health and hospital for children, Chennai, with two groups, Functional constipation group and Normal bowel pattern group. The functional group included the children with the age group of 2-12 years, of either sex who fulfilled the ROME III criteria for constipation. Normal bowel pattern group had school children of age group 6-12 years of age and 2-5-year-old children attending OPD for minor ailments. The demographic profile, socioeconomic status, complaints, psychosocial aspects affecting bowel pattern and diet chart

were collected and recorded from the parents in proforma. Stool frequency and type of stool passed were recorded for a week, with Bristol stool chart.

Results: A total of 523 and 131 children were analysed for normal bowel pattern and functional constipation respectively. Data analysis done using SPSS version 15. The prevalence of functional constipation was noted in 13.5% with female preponderance and in the age group of 2-4 years.

Conclusion: Constipation continues to be a problem, mostly under recognised in older population. Psychosocial factors had a significant effect on functional constipation. Skipping breakfast, early toilet training, low intake of vegetables and fruits were other factors of significance leading to constipation.

Keywords: Bristol stool chart, Bowel pattern, Psychosocial factors

INTRODUCTION

Constipation during childhood is one of the common complaints faced by any paediatrician in their day to day practice and accounts for 3% of visits for paediatricians and 30% of visits for paediatric gastroenterologist [1]. It is difficult to describe constipation in children's as its presenting symptoms are diverse ranging from infrequent bowel movements, difficulty in defecation, distress symptoms of faecal incontinence, retentive posture, withdrawal behaviour, etc. Different people have different perceptions of symptoms, some regard constipation as straining at stools, while for others it means hard pellet-like stools or inability to defecate when desired or infrequent defecation. The definition of functional constipation as per the Rome III Diagnostic Criteria for FGID (Functional Gastrointestinal Disorders) must include one month of at least two of the following in infants up to four years of age:

1. Two or fewer defecations per week
2. At least one episode/week of incontinence after the acquisition of toileting skills
3. History of excessive stool retention
4. History of painful or hard bowel movements
5. Presence of a large faecal masses in the rectum
6. History of large diameter stools which may obstruct the toilet.

Accompanying symptoms may include irritability, decreased appetite, and or early satiety. The accompanying symptoms disappear immediately following passage of a large stool [2].

The prevalence of childhood constipation in general population range from 0.7% to 29.6% [1]. Even though there were good number of data's on constipation, most of them were from the developed countries and very few were available in India, especially from Southern parts of India. So, we undertook this study to find the prevalence of constipation in childhood and the effects of diet, age of toilet training, psychosocial factors etc. from ICH the largest referral tertiary care centre for paediatric in Southern India.

MATERIALS AND METHODS

A prospective descriptive study was done between May 2009 and November 2010 in the Outpatient Department (OPD) of Paediatric Gastroenterology, Institute of child health and hospital (ICH) for children, Egmore, Chennai. Study population was divided into two groups 1) Functional constipation group (FCG) and 2) Normal bowel pattern group (NBG). The functional constipation group included the children with the age group of 2-12 years, of either sex who attended gastroenterology OPD ICH and fulfilled the ROME III criteria for constipation. Children already on treatment for functional constipation and children with organic causes of constipation were excluded from the study. Normal bowel pattern group had school going children from two different schools within 6-12 years of age of both the sex and children with 2-5-year-old attending OPD of ICH for other minor ailments.

The demographic profile, socio-economic status, presenting complaints, psychosocial aspects affecting normal bowel pattern behaviour, like temper tantrum, marital disharmony, sibling rivalry, school phobia, aversion to use school toilet were collected and recorded from the parents in a pre-structured proforma. The diet patterns were also recorded by parents in a diet chart concentrating on the regularity of breakfast, vegetable and fruit intake, junk foods in the form of baked or fried items and regarding consumption of milk. Stool frequency and type of stool passed were recorded for a period of one week, with Bristol stool chart [3] being the reference which was provided to the parents [Table/Fig-1].






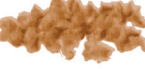

STATISTICAL ANALYSIS

The data collected were analysed and compared using SPSS version 15 for windows. Data were considered statistically significant if $p < 0.05$. For variables in qualitative form, chi-square test was used in the univariate analysis to observe the association between the study variables and outcome.

RESULTS

A total of 131(66 males and 65 females) children were enrolled in the functional constipation group and 523 (236 males and 287 females) children in the normal bowel pattern group. The age and sex distribution of the FCG and NBG and is expressed in [Table/ Fig-2].

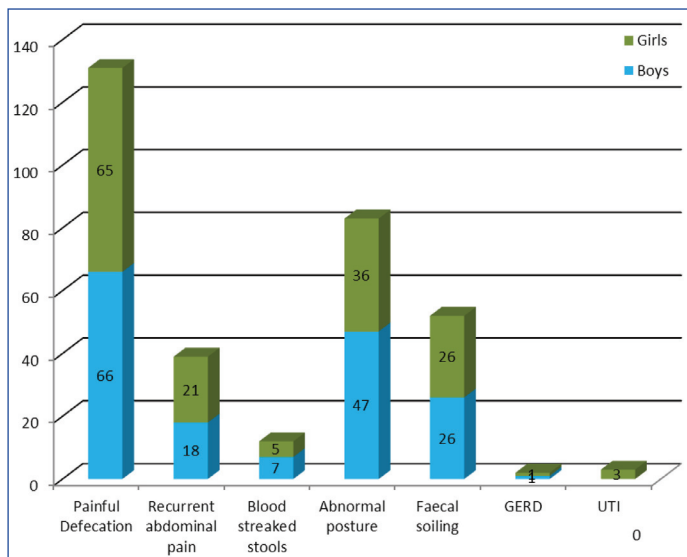
The data's collected from both the groups were compared and analysed for significance. The clinical profile of presentation in FCG is depicted in [Table/Fig-3]. Abnormal posturing as a symptom was more common in age group 2-4. The average number of stools passed per day in the NBG was 1.14. The type of stool passed by the children in both the groups as per Bristol stool chart is expressed in the [Table/Fig-4]. In the NBG 71 children had straining at stools with large stools satisfying the criteria for functional constipation (13.57%). In our study we found that functional constipation was more common in nuclear families 75.5% (n=131); similarly in the NBG also, constipation was more frequently seen with nuclear family 74.6% (n=71). Comparison of the psychosocial precipitating factors between the groups is shown in the [Table/Fig-5]. Consumption of junk food had no statistical significance on constipation neither did baked items. Fried food consumption had significant p-value of .030. In all 46.5% of children with constipation had fried snack items and 65.4% of children not having fried item passed normal stools. In

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid

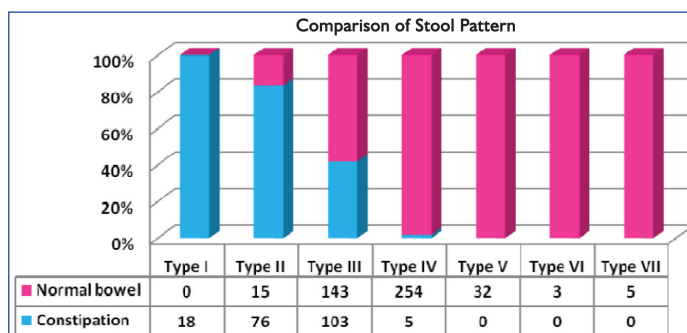
[Table/Fig-1]: Bristol Stool Chart Ref [3]

Age (years)	Functional Constipation Group			Normal Bowel Pattern Group				
	Boys	Girls	Total (%)	Boys Constipated		Girls Constipated		Total (%)
				YES	NO	Yes	No	
2-4	42	33	75 (57.25)	7	39	10	53	109 (20.84)
5-7	10	10	20 (15.26)	6	75	5	81	167 (31.94)
8-10	10	17	27 (20.61)	11	88	30	100	229 (43.78)
11-12	4	5	9 (6.88)	2	8	0	8	18 (3.44)
Total	66	65	131 (100)	26 (11.01% n=237)	210	45 (15.67% n=287)	242	523

[Table/Fig-2]: Age and sex distribution



[Table/Fig-3]: Clinical presentations in FCG



[Table/Fig-4]: Type of Stool

Precipitating Factors	Constipation (n = 202)		Normal bowel (n = 452)		p-value
	Yes (%)	No (%)	Yes (%)	No (%)	
Marital disharmony	47 (23.2)	155 (76.8)	65 (14.4)	387 (85.6)	0.004
Sibling rivalry	49 (24.3)	153 (75.7)	80 (17.7)	372 (82.3)	0.034
Temper tantrum	121 (59.9)	81 (40.1)	150 (33.2)	302 (66.8)	0.000
School phobia	22 (10.8)	180 (89.2)	25 (5.5)	427 (94.5)	0.001
Aversion to use school toilet	75 (37.1)	127 (62.9)	204 (45.1)	248 (56.9)	0.273
Breakfast skipped	29 (14.5)	173 (85.5)	29 (6.4)	423 (93.6)	0.001

[Table/Fig-5]: Comparison of precipitating factors between the functional and normal bowel pattern groups

the NBG 83.3% of children having fruits passed normal stools and 65.8% of FCG did not have fruits. This had a statistical significance of .000 p-values. Similarly vegetables had a significant p-value (.000) in functional constipation as evidenced by 85.5% of children having vegetables Cow's milk had no statistical significance in functional constipation in our study. Among those having constipation 15% had skipped breakfast whereas only 6.4% among those who did not have constipation skipped breakfast, making a significant observation (p=0.001).

DISCUSSION

This descriptive observational study was carried out to study the demographic, clinical profile and dietary, other precipitating factors in functional constipation, as well as to find the normal bowel pattern in South Indian children from a large tertiary care centre.

The prevalence of functional constipation based on the data from school children in our study were 13.57% (n=523), with increased female preponderance of constipation 63.3% (n=71). The prevalence of constipation in school age children from USA was found to be

18% in the study conducted by Lorenzo, Vera Loening-Baucke found that the prevalence of constipation was equal in both boys and girls and it was 0.3% to 8% in paediatric population [4,5]. Similarly Iacono et al., and Ciampo D et al., found the prevalence of constipation to be equal between girls and boys [6,7]. Ip et al., and Kajiwara et al., found an increased prevalence in girls 32% and 24.2% as compared to boys 21% and 13.2% respectively, similar to our study [8,9]. Kokkonen et al., too showed more prevalence of constipation in girls [10]. Gannikou R et al., found a slight male preponderance of constipation with 6.4% of boys being constipated as against 5.7% in girls [11]. Khanna et al., also showed a male preponderance in functional constipation [1].

The mean age of the constipated children in our study was 5.18 years which was comparable with the study conducted by Kokkonen et al., where the mean age was 5.5 years [10]. Lorenzo et al., study found that peak incidence of constipation occurs at the time of toilet training between 2-4 years of age, with an increased prevalence in boys [4]. In our study 57.25% of functional constipation children were of the age group 2-4-year-old; whereas in general population nearly 75% of those who experienced constipation were between the ages 5-10 years. This may be because the parents were more concerned about bowel habits during younger age group and ceases to be a priority to parents/child as they grow older. The taboo and inhibitions in talking about bowel habits may be contributing significantly to this.

About 63.4% of children with functional constipation had retentive behaviours like abnormal posturing, unlike in the study of Khanna et al., where the incidence was only 27.4% [1]. This may be because; in the present study the choice of words used to describe retentive behaviour (abnormal posturing) gave us better sensitivity. Moreover the use of Bristol stool chart helped in correctly identifying stool consistency and correlate symptoms of functional constipation better. Retentive behaviour was more common in boys (56.6%) which are similar to study by Wald et al., [12]. In our study faecal soiling was present in 40.4% of children and was equally distributed between both sexes. Faecal soiling was 30.8% in the study conducted by Khanna et al., [1]. In the study by Wald et al., faecal soiling was more common in boys [12]. Faecal soiling was observed in 84% of children at presentation by Voskuijl which was very high as compared to our study [13]. Kokkonen et al., also showed a higher prevalence (62%) of faecal soiling in functional constipation [10].

Similar to Kokkonen et al., 29.7% of our children also presented with recurrent constipation with slight female preponderance [10], though Khanna et al., had reported a lower incidence of 18.8% in Indian population [1]. Weaver LT reported almost similar results (9%) for blood streaked stools as in the present study (12.9%) [14], but Khanna et al., had a prevalence of 24.8% [1], probably due to the higher incidence of organic pathology in their study. In our study 2.2% of children with functional constipation had Urinary Tract Infection when compared with 11% in the study by Loening-Blaucke [15]. Bowel movement per week in our study in the constipated group was 2.5. In Khanna et al., study the bowel movement per week was 2.8 and was comparable to ours [1].

Toilet training was started at an average age of 15.5 months in the constipated group as opposed to 27.8 months in children with normal bowel pattern. According to Croffie J coercive or inappropriate toilet training in a toddler not ready for toilet training may lead to withholding and passage of dry hard stools and painful defecation [16]. Bhaskar Raju in his review article states that the ideal age for toilet training is between 2-3 years [17]. There seems to be relevance in the age of start of toilet training and occurrence of constipation.

Marital disharmony, sibling rivalry and school phobia had significance in functional constipation in our study, but due to the paucity of similar studies comparisons were not possible; hence, further studies are needed in this regard. Barbara F in her study observed

that 63% of school children do not use the school toilet to defecate [18], 16% of them never urinate and 15% of children always try to avoid using the toilet. So the author feels there is a precarious situation for school children undergoing treatment of bladder and bowel dysfunction. Moreover irregular toilet habits are contributing factors to functional constipation. Though 75 (59.9%) of the total 134 children with constipation of school age had aversion to use school toilet, no significance could be arrived as children with normal bowel group were also equally having aversion to use school toilet. Irregular breakfast intake had significance in our study with regards to functional constipation. There are no studies regarding this variable on functional constipation. Cow's milk intolerance can lead on to constipation according to Iacono et al., [19], but Simeone et al., found no relation between cow's milk and constipation [20]. In our present study also there was no significant difference among those who had cow's milk and those who did not.

The fibre intake in our study group was mainly from cereals. Vegetables and fruits intake was low in most children and very low in constipated group with less than one serving per day. 65.8% of constipated group did not have fruit and 72.3% of them did not have vegetables. Roma et al., state that low fibre intake is common in children with chronic constipation [21]. Childhood constipation is much more frequent when dietary fibre intake is restricted according to Ip et al., & Araujo et al., found that dietary fibre intake was insufficient in all children and even lower in those with constipation, similar to our study [8,22]. 15% of those who had constipation were found to skip breakfast when compared with 6.4% of those who did not have constipation. The most likely time for a bowel action is about 30 minutes after the first meal of the day probably by the activation of gastro colic reflex after a relatively quiescent bowel activity during sleep. This makes it important not to skip breakfast. In addition this aversion to use school toilets will facilitate stool retentive behavior leading to the vicious cycle of hard painful stools furthering constipation.

In our study the average number of bowel movements per day was 1.14, and predominantly children passed soft stools (type IV of Bristol stool chart) this was comparable to other studies. In the study by Wald et al., found that most children between 5-8 years of age have medium size bowel movement daily or every other day without straining [12]. According to the study done by Yong et al., 96% of school children had a stool frequency between the range of three times a day and once every two days [23]. Weaver and Steiner also found that 96% of 1-4-year-old passed stools in the range of three times a day to every other day [24]. At all age children passed soft stool though there was year by year increase in the passage of hard stools. The mean average of stool passed per day for 2-year-old was 1.7 and became 1.2 stools per day at 4 years of age.

CONCLUSION

The prevalence of constipation as per our study in general paediatric population is 13.57% with increased preponderance to the female children. The age group of presentation of functional constipation was significantly lower (2-4 years); but constipation continues to be a problem, mostly under recognised in older population, as 75% of those who experienced constipation among the general paediatric population were between 5-10 years. Psychosocial factors like marital disharmony, sibling rivalry and school phobia had a significant effect on functional constipation. Skipping breakfast, early toilet training, low intake of vegetables and fruits were other factors of significance leading to constipation. Use of visual inputs like Bristol's chart, coupled with use of simple terms for symptomatology while collecting data, helps in getting more accurate data in investigating subjective complaints like constipation.

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Date of Submission: **Feb 04, 2015**Date of Peer Review: **Mar 09, 2015**Date of Acceptance: **Apr 27, 2015**Date of Publishing: **Jun 01, 2015****FINANCIAL OR OTHER COMPETING INTERESTS:** None.