

Clinical Manifestations and Etiology of Pediatric Constipation in North India

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Abstract

Introduction: Childhood constipation is a common problem worldwide. This study aims to analyze the etiology and clinical spectrum of constipation in North Indian children according to gender and age group.

Materials and Methods: This prospective cross-sectional study was conducted in a tertiary care teaching hospital. All patients with constipation managed at our pediatric outdoor clinic from March 2014 to December 2015 were included. Relevant history, demographic data, clinical characteristics, and final diagnosis were recorded prospectively in a pre-designed performa.

Result: During the study period, 156 patients were enrolled. The most commonly affected age group was the pre-school children (46.15%) followed by infants (31.41%), school-age children (18.59%), and adolescents (3.85%). Males made up 60.38% of the study population. There were no statistical gender differences in any age group. Hard, dry, painful defecation was the most common manifestation (85.26%) and was seen maximally in the pre-school age group (91.67%). Fecal impaction (59.62%) was seen more commonly in adolescents (83.33%) and pre-school children (70.83%). Infrequent evacuation (<three/week) was seen in over half of the patients (55.13%) with a progressive non-significant increase with increasing age. Fecal incontinence (soiling) was most commonly seen in school-age children (75.86%) and was significantly different compared to pre-school children. Abdominal pain (16.03%) was more common in adolescents (50%), whereas withholding behavior (38.46%) was more prevalent in pre-school children and infants. Functional constipation (87.18%) was the most common case of constipation and occurred maximally in the pre-school age group (94.44%). Hirschsprung's disease was responsible for 50% of cases of organic constipation.

Conclusion: The fact that constipation occurs quite frequently among Indian children and that functional constipation is the most common cause of constipation. Stool consistency and painful defecation are more sensitive parameters to diagnose constipation. Pre-school children are more commonly affected, and male predominance is noticeable, especially in organic (pathologic) constipation.

Key words: Adolescent, Constipation, Infant, Pre-school, School-age

INTRODUCTION

Childhood constipation is a common problem. The Paris Consensus on childhood constipation terminology defines constipation as a period of 8 weeks with at least two of the following symptoms: Defecation frequency less than three

times per week, fecal incontinence frequency greater than once per week, passage of large stools that clog the toilet, palpable abdominal or rectal fecal mass, stool withholding behavior, or painful defecation.¹

The prevalence of childhood constipation in general population varies widely ranging from 0.7% to 29.6% (median 10.4%)² and is more frequent when dietary fiber intake is restricted. It accounts for 3% of visits to general pediatric clinics and as many as 25-30% of visits to pediatric gastroenterologists.³⁻⁵ Chronic constipation causes anxiety in parents who worry that there may be a serious underlying disease. Yet, only a small minority of children has an organic cause for constipation. Beyond

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the neonatal period, functional constipation (i.e., without objective evidence of a pathological condition) is the most common cause. Functional constipation is most commonly caused by painful bowel movements that prompt the child to volitionally withhold stool and adopt retentive posturing. Withholding of stool leads to fecal stasis with reabsorption of fluid in the colon, causing the stool to become bulky, firm, and painful to pass. Subsequently, as the rectum stretches to accommodate these retained feces, the rectal sensation decreases, and fecal incontinence may develop. This cycle typically coincides with toilet training, dietary changes, stressful events, illness, lack of accessible toilets, or occurs in a preoccupied child who defers defecation.⁶

It is widely believed that functional constipation is infrequent in developing countries possibly due to high fiber content in their diet. In India, very few studies have been done to gauge the true size of the problem and to assess the relative frequency of gastrointestinal symptomatology among children with constipation. Hence, this study was undertaken to evaluate the etiology and clinical spectrum in patients with constipation according to age group and gender.

MATERIALS AND METHODS

The study was conducted in the Outdoor Patient Department of Pediatrics, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India, from March 2014 to December 2015. The study was approved by the Institutional Ethics Committee. Consecutive patients with constipation, both organic and non-organic (functional) were enrolled for the study. Constipation was defined as difficulty in defecation or infrequent bowel movements for two or more weeks and sufficient enough to cause significant distress.⁷ Exclusion criteria were patients with constipation for less than 2 weeks. At the very first visit, detailed history was taken from the patient/caretaker including presenting complaints such as age at presentation, duration of constipation, bowel motion frequency, bowel motion consistency, pain with defecation, stool withholding behavior, presence of blood with bowel motion, fecal incontinence, and the presence of fecal impaction or an abdominal mass associated symptoms. Physical examination, including digital per rectal examination, was done the same day. The latter was deferred in cases of painful anal fissure or patient/parental refusal. Functional constipation was diagnosed based on ROME III criteria.

Children up to 4 Years⁸

At least 2 of the following symptoms must occur for at least 1 month:

- ≤ 2 defecations per week
- ≥ 1 episode per week of incontinence after the acquisition of toileting skills
- History of excessive stool retention
- History of painful or hard bowel movements
- Presence of a large fecal mass in the rectum and
- History of large-diameter stools that may obstruct the toilet.

Children above 4 Years and Adolescents⁹

Symptoms must occur at least once per week for at least 2 months and include 2 or more of the following in a child with a developmental age of >4 years with insufficient criteria of irritable bowel syndrome:

- Two or fewer defecations in the toilet per week
- At least 1 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
- History of large-diameter stools that may obstruct the toilet.

Fecal impaction was defined as a hard mass palpable in the lower abdomen or a dilated rectum with large amount of hard stool on per rectal examination. Stool avoidance behavior (withholding), often misinterpreted as straining, was considered in infants with back-arching, and in older infants/toddlers, with standing on toes, extending legs or rocking back and forth to prevent anal relaxation. Some children tend to hide in a corner standing stiffly or squatting.¹⁰ Fecal incontinence was defined as repetitive, involuntary passage of any amount of feces, at an inappropriate place once a week or more after attainment of toilet skills.¹¹ Children who attained control before 24 months were not considered. Relevant investigations were done to rule out organic pathologies when suspected. Hirschsprung's disease (HD) was diagnosed only after rectal/colonic biopsy showed the absence of ganglion cells. In suspected cases of spinal abnormalities, magnetic resonance imaging of the spine was done. Celiac disease was diagnosed if the patient had positive tissue transglutaminase titers and jejunal biopsy was consistent with celiac disease. Cow's milk protein allergy was diagnosed if elimination of cow's milk resulted in improvement of symptoms and when recurrence of symptoms was seen after reintroduction of cow's milk. Thyroid profile was done in suspected cases of hypothyroidism.

For data analysis and comparison, we divided the patients into four groups according to age: Infants (0-23.9 months), pre-school (2-6 years), school-age (6-12 years), and adolescents (12-18 years).

Statistical Methods

The SPSS Statistics 17.0 (SPSS Inc., Chicago, IL, USA) was used. Results were expressed as mean with standard deviation or median with range, as required. Categorical data were tested with Fisher's exact test and continuous data with independent sample *t*-test. $P < 0.05$ was considered significant.

RESULTS

A total of 156 children with constipation were included in the study. Of the 156 patients, 96 (60.38%) were male. A male preponderance was noticed in all the age groups except in the school-age children. However, no statistically significant gender difference was noticed in any age group. The most commonly affected age group was the pre-school children (46.15%) followed by infants (31.41%), school-age children (18.59%), and adolescents (3.85%). The average duration of constipation progressively increased with age (Table 1).

Among the clinical spectrum, hard, dry, painful defecation was the most common manifestation (85.26%) and was seen maximally in the pre-school age group. Fecal impaction was the next common presentation (59.62%) and was seen more commonly in adolescents (83.33%) and pre-school children (70.83%). Infrequent evacuation (<three/week) was seen in over half of the patients (55.13%) with a progressive non-significant increase with increasing age.

Fecal incontinence (soiling) was most commonly seen in school-age children (75.86%) and was significantly different compared to pre-school children ($P < 0.001$). Fecal incontinence was more prevalent in boys (31.81%) than girls (23.53%). Withholding behavior was more prevalent in pre-school children and infants. The prevalence of abdominal pain progressively increased with age, being maximal in adolescents (50%).

Abdominal pain, blood in stools, and abdominal distension were more commonly seen in girls, but only abdominal pain was statistically significant ($P = 0.020$).

On physical examination, fecal mass in rectum was found in 52.56% children with constipation, with boys being more prone ($P = 0.010$). Perianal tag, fissure, or cellulitis was seen in 14.26% infants, 36.11% pre-school children, and 10.34% in school-age group (Infants compared to pre-school $P = 0.0148$; pre-school compared to school-age $P = 0.019$) (Table 2).

Functional constipation was the most common diagnosis (87.18%) and was seen most commonly in the pre-school age group (94.44%). The etiological spectrum is displayed in Table 3. HD was responsible for 50% of cases of organic constipation and comprised 6.41% of the total cases of constipation. All cases of HD were associated with delayed passage of meconium. Other organic causes included spina bifida (1.92%), cerebral palsy (1.92%), hypothyroidism (1.28%), celiac disease (0.64%), and anal stenosis (0.64%).

Male preponderance was seen in both the functional (1.52:1) ($P = \text{NS}$) and organic (2.33:1) ($P = \text{NS}$) constipation groups. Delayed passage of meconium and abdominal distension was more common in girls ($P = 0.011$), whereas fecal impaction was more commonly seen in boys ($P = 0.017$). Table 4 shows a comparison of clinical features of functional and organic constipation.

DISCUSSION

In our study, patients were divided into four age groups: Infants; pre-school children; school-age children; and adolescents. Male preponderance was noticed both in the functional (1.52:1) and organic constipation groups (2.33:1). Some researchers have reported higher prevalence in girls,¹² whereas others have reported no gender difference.^{2,13} The most commonly affected group was the pre-school children (46.15%). Maximum children from this group complained of hardened, dried and painful defecation (91.67%). In our study, we found that adolescents had a longer duration of symptoms, less frequent bowel motions, and higher prevalence of fecal impaction.

Table 1: Patient distribution by age, sex, and duration of constipation

Demographic variable	Infant 0-23 month	Pre-school 2-6 years	School-age 6-12 years	Adolescents 12-18 years	Total	<i>P</i> value
Patient	49 (31.41)	72 (46.15)	29 (18.59)	6 (3.85)	156 (100)	-
Male	31 (63.27)	41 (56.94)	13 (44.83)	3 (50)	88 (56.41)	NS
Female	18 (36.73)	31 (43.06)	16 (55.17)	3 (50)	68 (49.59)	NS
Average duration of constipation (months)	7.4 (1-17)	24 (2-46)	22 (1-49)	59 (6-128)	19.76 (1-128)	<i>P</i> value highly significant for all age groups* except between pre-school and school-age children

Values are presented as number (%) or number (range). NS: Not statistically significant between all age groups. *Highly significant P value= $(P < 0.001)$

Table 2: Clinical character of bowel motion and associated symptoms

Clinical variable	Infants (n=49)	Pre-school (n=72)	School-age (n=29)	Adolescents (n=6)	Total (n=156)	P value
<3 evacuation/week	25 (51.02)	40 (55.56)	16 (55.17)	5 (83.33)	86 (55.13)	NS
Blood with stool	13 (26.53)	14 (19.44)	3 (10.34)	0 (0)	30 (19.23)	NS
Hardened, dried, painful stool	47 (95.92)	66 (91.67)	15 (51.72)	5 (83.33)	133 (85.26)	0.0001 (between infant and school-age), 0.0001 (between pre-school and school-age); rest NS
Fecal incontinence	- (0)	20 (27.78)	22 (75.86)	4 (66.67)	46 (29.49)	0.0001 (between pre-school and school-age); rest NS
Withholding	19 (38.78)	38 (52.78)	3 (10.34)	0 (0)	60 (38.46)	0.0148 (between infant and school-age), 0.0002 (between pre-school and school-age); rest NS
Abdominal pain	2 (4.08)	12 (16.67)	8 (27.59)	3 (50)	25 (16.03)	0.008 (between infants and school-age), 0.0033 (between infants and adolescents), rest NS
Fecal impaction	27 (55.10)	51 (70.83)	10 (34.48)	5 (83.33)	93 (59.62)	0.0016 (between pre-school and school-age children); rest NS
Abdominal distension	5 (10.20)	3 (4.17)	8 (27.59)	0 (0)	16 (10.26)	0.0022 (between pre-school and school-age children); rest NS
Abdominal mass	2 (4.08)	9 (12.5)	5 (17.24)	0 (0)	16 (10.26)	NS
Perianal fissure/tag/cellulitis	7 (14.26)	26 (36.11)	3 (10.34)	0 (0)	36 (23.08)	0.0148 (between infant and pre-school), 0.019 (between pre-school and school-age children); rest NS
Fecal mass in rectum	29 (59.18)	38 (52.78)	10 (34.48)	5 (83.33)	82 (52.56)	NS
Functional constipation	39 (79.59)	68 (94.44)	24 (82.76)	5 (83.33)	136 (87.18)	NS

Values are presented as number (%). NS: Not statistically significant between all age groups

Less than three bowel motions are frequently used to label constipation but were noticed in only 55.13% of our patients. Hard, dry and painful defecation was the most consistent complaint (85.26%) across all age groups. This finding was in agreement with previous studies.^{12,14,15} Hence, it is suggested that stool consistency and painful defecation is more sensitive parameter to diagnose constipation. Pain abdomen was reported in only 16.03% of constipated children and the prevalence progressively increased with age.

Withholding behavior or retentive posturing is a characteristic feature of FC and is seen in 50-60% cases.^{7,9,14,16} This behavior was exhibited by only 39.71% of our study cases of FC, probably due to misinterpretation of symptoms by caretakers as “straining.”^{7,14} Similar prevalence has also been reported earlier.^{3,15,17,18} Infants and pre-school children showed a significantly higher prevalence of withholding behavior as compared to older children.

Fecal incontinence is a frequent association with FC having a prevalence ranging from 18% to 89%.^{14,18,19} In our study, 29.41% of children with FC had history of fecal soiling. School-age children and adolescents showed the highest rate of fecal incontinence. Similar findings have been reported earlier by previous studies,^{12,20} while some other studies have reported much higher figures.^{18,21} Fecal incontinence signifies severity of constipation, prolonged

Table 3: Etiology of constipation in study subjects

Etiology	Number (%)
Functional	136 (87.18)
Motility-related organic causes	
Hirschsprung's disease	10 (6.41)
Congenital anomalies	
Anorectal malformation (anal stenosis)	1 (0.64)
Spina bifida	3 (1.92)
Neurologic disorders	
Cerebral palsy	3 (1.92)
Celiac disease	1 (0.64)
Hypothyroidism	2 (1.28)

duration of constipation, and is considered to be a negative prognostic factor for successful outcome.^{3,22}

On physical examination, fecal impaction in the rectum was the most consistent finding across all age groups (59.62%), with adolescents being maximally affected (83.33%). This was probably due to longer duration of constipation in them. Perianal tags, fissures, and cellulitis (23.08%) were more frequently encountered in pre-school children and infants. Similar findings have been reported earlier.^{12,23}

About 13% of our patients had an organic cause for constipation. These results are in agreement with previous studies,^{12,15} including one from India, which showed the prevalence of organic constipation to be 14.6% and 18.3%, respectively. These figures are higher than approximately

Table 4: Comparison of clinical features between children with functional and organic constipation

Clinical features	Functional constipation (n=136)	Organic constipation (n=20)
Male:Female	1.52:1	2.33:1
Duration of symptoms (months)	17.14 (20.12)	37.58 (37.39)
Delayed passage of meconium, (%)*	2 (1.47)	10 (50)
Stools/week, mean (SD)	2.8 (1.8)	2.6 (1.3)
Painful defecation (%)	27 (19.85)	1 (5)
With holding (%)	54 (39.71)	6 (30)
Fecal incontinence (%)	40 (29.41)	6 (30)
Rectal bleeding (%)	27 (19.85)	3 (15)
Pain abdomen (%)	22 (16.18)	3 (15)
Fecal impaction (%)*	90 (66.18)	3 (15)
Abdominal distension (%)*	6 (4.41)	10 (50)

*P<0.001. SD: Standard deviation

5-10% prevalence reported from developed countries.^{24,25} History of delayed passage of meconium, abdominal distension, and absence of fecal impaction are suggestive of an organic pathology, whereas fecal incontinence, fecal impaction, and withholding behavior are pointers toward FC.¹² Our study reinforces this fact.

HD is the most important cause of organic constipation accounting for around 3% of constipated children.¹⁸ We found a prevalence of 6.18% in our study. All cases of HD had a history of delayed passage of meconium, and digital rectal examination did not show fecal impaction. Out of the two cases of hypothyroidism: One was an adolescent girl with progressive obesity (body mass index >27th adult equivalent) and chronic constipation. She was later diagnosed as Hashimoto's thyroiditis. The another child was an infant (11 months) with delayed motor milestones, lethargy, and abdominal distension. It was a previously undiagnosed case of congenital hypothyroidism. Other organic causes found in our study were cerebral palsy (1.92%), meningomyelocele (1.92%), anal stenosis and celiac disease (0.64% each).

Fewer numbers of adolescents in our study group limit the generalization of our results in this age group. The management of constipation was not considered in this study which is another limitation to our study. Toward the positive side, the study highlights the clinical constellation of pediatric constipation according to age group and gender; furthermore, it delves into the underlying causes of constipation and their associated symptomatology.

In summary, FC is the most common cause of constipation in children in North India, and only 13% patients have an organic pathology. This study reiterates the fact that pediatricians should refrain from going for extensive investigations, especially to rule out HD in all cases of childhood constipation.

CONCLUSION

This study documents the fact that constipation occurs quite frequently among Indian children and that functional constipation is the most common cause of constipation. Stool consistency and painful defecation are more sensitive parameters to diagnose constipation. Pre-school children are more commonly affected, and male predominance is noticeable, especially in organic (pathologic) constipation.

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