

# Review Articles

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## Approach to Child with Constipation and Management Update

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### Abstracts:

*Constipation is a common problem in childhood that need frequent visit to pediatrician. The objective of this review is to provide the general pediatrician an overview of constipation in children discussing the etiology, patient evaluation and management. This review provides an approach to a child with constipation based on the best available evidence from electronic literature searches. Most common etiology of childhood constipation is functional and it needs no laboratory tests. Laboratory investigations are to be done if there are any alarming signs. Management is to do disimpaction if fecal impaction present, then long term maintenance therapy along with behavioral therapy ensure full recovery.*

**Key words:** Child, Constipation, Review.

### Introduction:

Constipation is a common health problem in children. Children with constipation frequently visit to physician. It accounts for 3-5% of visits to pediatric outpatient clinics and 35% of referrals to pediatric gastroenterologists.<sup>1</sup> According to available data prevalence is higher in the South Asian region and in South America, than in any other part of the world.<sup>2</sup> Constipation causes significant healthcare burden more than many other common childhood diseases<sup>3</sup>. Constipation is a global health problem. The worldwide prevalence of childhood constipation is estimated between 0.7% to 29.6%.<sup>4</sup> In Asia (including infants-adolescents), reported prevalence is between 0.5% and 29.6%.<sup>2,5-7</sup> Constipation more common in toddlers and preschool children and 17% - 40% constipation starts in first year of life.<sup>8,9</sup> Childhood constipation Common in 3 times: during transition to solid food, during toilet training, after starting school.<sup>10</sup>

Frequency and type of stool varies according to child's age, diet and stage of maturation. Significant difference

was found in stool frequency between breastfed and formula-fed babies at 1 month of age [4 (0-9) vs. 1 (0-5) per day] but at 3 months of age there was no difference.<sup>11, 12</sup> By the age of 4 years, like adults the stool frequency gradually changes to one to two stools per day.

### What is constipation?

Constipation is generally defined as infrequent passage of hard stool. The NASPGHAN defines constipation as a delay or difficulty in defecation, present for 2 or more weeks and sufficient to cause significant distress to the patient.<sup>13</sup> Constipation may be acute or chronic. Duration of constipation is less than two weeks is acute and more than two weeks is chronic. Constipation may be occult or overt. In occult constipation patients or parents do not complain of constipation though there is constipation. In overt constipation there is obvious constipation. Constipation may be Functional or Organic.

### Etiology:

The major causes of constipation in children can be divided broadly into two categories: functional and organic. 95% causes are functional and only 5% are organic causes<sup>14</sup>. Common causes of constipation in children are given in table-I. Hirschsprung disease is the most common and important organic cause.<sup>15</sup> Hirschsprung's disease should be differentiated from idiopathic constipation. Difference between functional and Hirschsprung disease given in table-II.

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**Table-I**  
*Causes and risk factor of constipation in children<sup>21</sup>.*

**Causes:**

- Functional constipation
- Anatomic malformation:  
-Imperforate anus, Anteriorly displaced anus, Anal stenosis
- Systemic Disorder  
Hypothyroidism, Hypercalcemia, Hypokalemia, Cystic Fibrosis,  
Celiac disease, Diabetes mellitus
- Intestinal Nerve and muscle disorder  
Hirschsprung disease, Prune belly syndrome
- Neuropathic condition  
Meningomyelocele, Tethered cord, Spinal cord tumor, Spinal cord trauma  
Cerebral palsy.
- Drugs  
Opiates, Phenobarbital, Antidepressants, Vitamin D toxicity, Lead toxicity

**Risk Factor:**

- Low fiber diet
- Psychological stress
- Cow's milk protein allergy
- Familial predisposition
- Prematurity
- Living in urban areas

**Table-II**  
*Difference between functional constipation and Hirschsprung disease<sup>16</sup>*

Features	Functional constipation	Hirschsprung disease
• Delayed passage of meconium	None	Common
• Onset	After 2 years	At birth
• Fecal incontinence	Common	Very rare
• History of fissure	Common	Rare
• Failure to thrive	Uncommon	Possible
• Enterocolitis	None	Possible
• Forced bowel training	Usual	None
• Abdominal distension	Rare	Common
• Rectal examination	Stool	Empty
• Malnutrition	None	Possible

**Functional constipation (FC):**

Functional constipation is defined as constipation without objective evidence of a pathologic condition. The New Rome IV criteria for functional constipation have been released

**Table-III**  
*Rome IV criteria for the diagnosis of functional constipation in children<sup>17, 18</sup>*

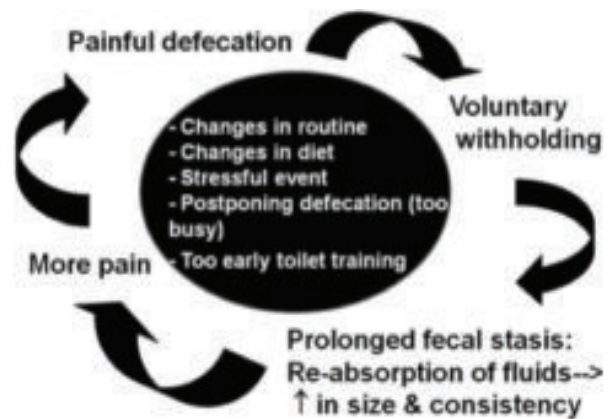
<p><b>Infants and toddlers up to 4 years old</b></p> <p>At least two of the following present for at least one month</p> <ul style="list-style-type: none"> <li>• Two or fewer defecations per week</li> <li>• History of excessive stool retention</li> <li>• History of painful or hard bowel movements</li> <li>• History of large-diameter stools</li> <li>• Presence of a large fecal mass in the rectum</li> </ul> <p>In toilet-trained children, the following additional criteria may be used:</p> <ul style="list-style-type: none"> <li>• At least one episode/week of incontinence after the acquisition of toileting skills</li> <li>• History of large-diameter stools that may obstruct the toilet</li> </ul>	<p>Children with developmental age of at least 4 years</p> <p>At least two of the following present at least once per week for at least one month*</p> <ul style="list-style-type: none"> <li>• Two or fewer defecations in the toilet per week</li> <li>• At least one episode of fecal incontinence per week</li> <li>• History of retentive posturing or excessive volitional stool retention</li> <li>• History of painful or hard bowel movements</li> <li>• Presence of a large fecal mass in the rectum</li> <li>• History of large-diameter stools that may obstruct the toilet.</li> </ul>
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\*The symptoms cannot be fully explained by another medical condition.

**Pathophysiology:**

Functional constipation in children is commonly caused by withholding of feces for multiple reasons. Painful defecation as the commonest factor for constipation.<sup>19</sup> Painful bowel movements lead to withholding in an attempt to avoid the unpleasant defecation experience. Events that causes painful defecation are changes to routine or diet, stressful events, comorbid illness, unavailability of toilets, the lack of privacy in school facilities or postpones defecation- busy in another extremely interesting activity. Voluntary withholding consists of voluntary contraction of the external sphincter in an attempt to push the stool back up into the sigmoid colon. The sigmoid then accommodates the fecal mass and the urge to defecate is postponed. Withholding of feces leads to fecal stasis, re-absorption of fluids and an increase in the size and consistency of stools. Large and hard stools result in painful stretching of the anus and a resultant avoidance of defecation in an attempt to avoid this pain. This vicious cycle continues. These children develop a retentive posture or “stool-withholding maneuver” which parents feel that the child is trying hard (straining) in an attempt

to pass stool when the child is actually trying his best to stop it. Liquid stools from the proximal colon seep around hard retained stool cause fecal incontinence. 30% children with functional constipation develop fecal incontinence<sup>8</sup>.



**Fig.-1: Pathogenesis of functional constipation**

**Clinical presentation of constipation:**

A detail history and thorough physical examination are the cornerstones in assessing a child with constipation. A medical history should include the

family's definition of constipation and a careful review of the frequency, consistency and size of stools; age at onset of symptoms; history of fecal incontinence, parents seek medical attention of diarrhea, h/o about dysuria, dietary history, history of retentive posturing. Common retentive posture is given in table 4. The presence of retentive posture or withholding behaviors supports the diagnosis of functional constipation. History should be taken regarding alarming symptoms: passage of meconium >48 hours, Family history of HD, ribbon stool, blood in stool in absence of anal fissure, failure to thrive, bilious vomiting.

**Table-IV**  
*Common retentive posture*

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• Stand on tip toe
• Squatting
• Cross ankle
• Stiffening the body
• Tightening the buttock
• Holding onto furniture
• Flash, sweating & crying
• Hiding in corner during defecation

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Physical examination should include anthropometry, abdominal examination, an external examination of the perineum and perianal area, an evaluation of the thyroid and spine, and lower extremities for tone, strength and reflex. A digital examination of the anorectum is necessary to assess for perianal sensation, anal tone, rectum size, anal wink and amount and consistency of stool in the rectum. The presence of a hard mass in the lower abdomen combined with a dilated rectum filled with hard stool indicates fecal impaction. In Hirschsprung disease, the rectum is empty and after removing finger gush of liquid stool came out. The physical findings distinguishing organic constipation from functional constipation Table-V.

**Table-V**

*Alarm signs symptoms and physical findings distinguishing organic constipation from functional constipation<sup>20</sup>*

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- Constipation starting extremely early in life (<1 month)
  - Abdominal distention
  - Passage of meconium >48 hours
  - Ribbon stools
  - Blood in the stools in the absence of anal fissures
  - Failure to thrive
  - Fever
  - Bilious vomiting
  - Occult blood in the stool
  - Extreme fear during anal inspection
  - Lack of lumbosacral curve
  - Pilonidal dimple covered by tuft hair
  - Midline pigmentary abnormalities of the lower spine
  - Sacral dimple
  - Sacral agenesis
  - Anteriorly displaced anus
  - Perianal fistula
  - Perianal scars
  - Abnormal position of anus/ Patulus anus/ Flat buttocks
  - Abnormal thyroid gland
  - Family history of Hirshprung's disease
  - Tight, empty rectum in the presence of palpable abdominal fecal mass
  - Gush of liquid stool and air from the rectum on withdrawal of finger
  - Gluteal cleft deviation
  - Absence or delay in relaxation phase of the lower extremity deep tendon reflexes
  - Absence of anal wink
  - Absent anal or cremasteric reflex
  - Decreased lower extremity tone and/or strength/ reflex
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**Laboratory investigations:**

As 95% etiology of childhood constipation is functional and only 5% is organic. Functional constipation needs no laboratory tests. Laboratory investigations are to be done to exclude the organic causes or if there is any alarming signs.<sup>21</sup>

### Abdominal radiography

Findings are fecal impaction and distended bowel loop (Figure 2). But it is not recommended by The ESPGHAN and NASPGHAN guidelines, which is a widely accessible and cheap procedure. A major disadvantage is the radiation exposure for the patient. A plain abdominal radiograph may be used in a child if fecal impaction is suspected but in whom physical examination is unreliable/not possible.<sup>21</sup>



**Fig.- 2:** Circles on this X-ray of constipation in a young child show areas of fecal material in the large bowel and rectum.

### Barium enema:

It reveals a diffusely dilated colon and rectum in functional constipation. A barium enema should not be used as an initial diagnostic tool for the evaluation of FC<sup>21</sup>. But it is needed to differentiate from Hirschsprung disease. The findings of reversal of rectosigmoid ratio (sigmoid becomes more dilated than rectum) and documentation of transition zone on barium enema suggest the diagnosis of HD.<sup>16</sup>

### Anorectal manometry:

An anorectal manometry can be a useful screening tool in older children with untreatable constipation with suspicion of Hirschsprung disease.<sup>21</sup> An abnormal recto-anal inhibitory reflex is an indication to perform a rectal suction biopsy. Colonic manometry can help to

distinguish between children with normal colon motility and those with colonic neuromuscular disorders<sup>22</sup>.

### Rectal suction biopsy:

To confirm the diagnosis of HD, rectal biopsy and histopathology must be done which is the gold standard for diagnosing Hirschsprung's disease. Histopathological analysis of these biopsies stained with hematoxylin and eosin (H&E) and/or acetylcholinesterase (AChE) shows absence of submucosal ganglion cells and an increase in nerve fibers in the submucosa and an increase in nervous filaments in the lamina propria.<sup>23</sup>

Allergy testing for cow's milk allergy, Thyroid function test, Serum calcium, S. potassium, Sweat chloride test, Serum Lead level and Celiac panel:

Routine allergy testing for cow's milk allergy is not recommended in children with constipation in the absence of alarm symptoms. Laboratory testing to screen for hypothyroidism, celiac disease, and hypercalcemia is not recommended in children with constipation in the absence of alarm symptoms.<sup>17</sup>

### Colonic transit time:

The colonic motility can be determined by Colonic transit time. There is no recommendation to use colonic transit time for the diagnosis of functional constipation (FC). Colonic transit time can only be used in unclear cases to distinguish between FC and functional non-retentive fecal incontinence.<sup>24</sup>

### X-ray spine/ MRI of spine:

It is recommended if there is any alarming sign like sacral dimple, absent of cremasteric reflex or abnormality in tone, reflex in lower limbs.

Urine routine examination & culture:

It needs as fecal impaction predispose urinary tract infection.

### Treatment:

Treatment of a child with constipation depends on underlying etiology. If underlying etiology is anatomic or metabolic or other definite cause then to treat the cause. But treatment of functional constipation is difficult. The length of treatment varies and it may take from a few months to years<sup>25, 26</sup>. Suggested approach to constipation in children is shown on Figure 3<sup>16</sup>. Goal of treatment are (a) establish regular defecation pattern (b) eliminate symptoms of pain (c) stop incontinence (d) prevent relapse<sup>13</sup>. Management approach for functional constipation is two types. Non-pharmacological and pharmacological approach on table 6.

**Table-VI**

*Non-pharmacological and pharmacological management of functional constipation in children* <sup>27</sup>

Non-pharmacological management	Pharmacological management
<ul style="list-style-type: none"> <li>• Education</li> <li>• Behavioral treatment</li> <li>• Dietary management</li> <li>• Toilet training</li> </ul>	<ul style="list-style-type: none"> <li>• Osmotic laxatives (magnesium hydroxide, magnesium sulphate, lacticol, lactulose, glycerine suppositories)</li> <li>• Stimulants (bisacodyl, castor oil)</li> <li>• Softeners (docusate sodium, liquid paraffin)</li> <li>• Bulk-producing agents (methylcellulose, dietary fibre, psyllium)</li> <li>• Serotonin receptor agonists (Tegaserod)</li> <li>• Spasmolytics (Trimebutine)</li> <li>• Probiotics (data still conflicting)</li> </ul>

**Non-pharmacological approach:**

**Education:**

At first parents and caregivers need to be educated for additional advantages of treatment and to avoid mistakes in the whole therapy process (e.g. if family members do not follow dietary instructions, or, something that is totally unacceptable). Education is as important as medical therapy and should include counseling families to recognize withholding behaviors and to use behavioral interventions, such as regular toileting, use of diaries to track stooling, and reward systems for successful evacuations.<sup>28</sup>

**Dietary intervention:**

A normal fiber and fluid intake is recommended, while the addition of prebiotics and probiotics to the regimen currently does not seem to be supported by adequate evidence. The recommendation of dietary fiber for children older than 2 years of age is: age in years + 5 = number of grams of fiber/day.<sup>29</sup>

Normal fluid intake for children according to Holiday et al<sup>30</sup> recommendations are among the most useful methods for calculating total fluid intake (in ml). For children with body weight 1–10 kg = 100

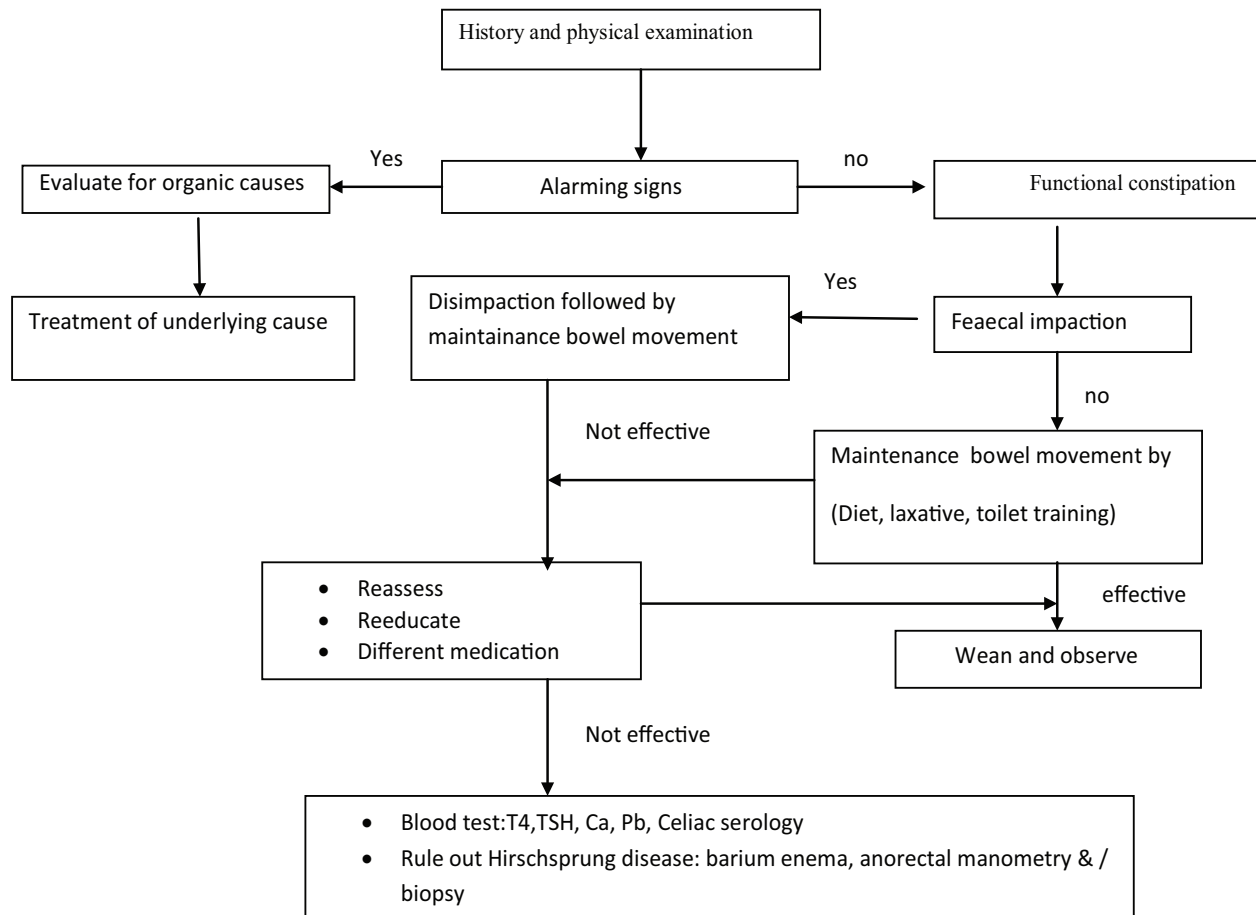
ml/kg, for children with body weight 11–20 kg = 1000 ml + 50 ml/kg for every kg over 10 kg of body weight, for children with body weight above 20 kg = 1500 ml + 20 ml for every kilogram above 20 kg of body weight. Total fluid ingestion (depending on the child's age) included milk (limited to 230–350 ml), Fruit juices (not more than 120 ml/day) and pure water.

**Behavioral therapy:**

The recent guideline does not support behavior therapy unless children present with behavioral abnormalities.<sup>21</sup> But, a recent meta-analysis and a cochrane study suggest that behavior therapy added to laxative therapy may improve symptoms of children with constipation-associated fecal incontinence.<sup>31,32</sup>

**Toilet training:**

This means a regular process of training a young child to use the toilet usually 10-15 min after a main meal. There is a natural reflex mechanism (gastrocecal, gastrocolic, and duodenocolic reflexes), which stimulates the urge to defecate and which works best. The toilet training is useless until a child has control over the bowel and bladder muscles and is familiar with the toilet seat.



**Fig.-3:** Approach to child with constipation

### Pharmacological management

The pharmacologic approach comprises 2 steps: rectal or oral disimpaction for children who present with fecal impaction and maintenance therapy to prevent reaccumulation of feces using a variety of agents.<sup>33</sup>

### Disimpaction

First step in the pharmacologic management of constipation is to decide whether the child has fecal impaction or not. It is identified by significant stool mass on abdominal examination or fecal loaded rectum on digital rectal exam or abdominal X-ray or constipation associated fecal incontinence<sup>34</sup>. Routinely abdominal X-ray is not required to detect fecal impaction. However, if the child refuses rectal

examination or if physical examination is unreliable/ not possible due to obesity then only an abdominal X-ray is required to document excess fecal matter in the colon.

When fecal impaction is present, disimpaction is required with oral or rectal medication before initiation of maintenance therapy. Oral medications are less invasive but require more patient cooperation and may be slower to relieve symptoms. A number of therapies are available on table 7.

Rectal therapies and polyethylene glycol are similarly effective in the treatment of fecal impaction in children (35). Although some evidence supports polyethylene glycol as first-line treatment, the overall data do not clearly demonstrate superiority of one laxative (36).

**Table-VIII**  
*Therapies for Disimpaction in Children<sup>23</sup>*

Therapy	Dosage
<b>A) Rectal agents</b>	
<i>Enemas (one per day)</i>	
Saline	5 to 10 mL per kg
Mineral oil	15 to 30 mL per year of age up to 240 mL
Phosphate soda	2 to 12 years of age: 66-mL enema (should not to be used in children < 2 years because of the risk of electrolyte abnormality)> 12 years: 133 mL
<i>Suppository (one per day)</i>	
Bisacodyl	≥ 2 years: 5 to 10 mg (½ to 1 suppository)
Glycerin	½ to 1 infant suppository; adult suppository for those older than 6 years
<b>B) Oral</b>	
<i>Osmotics</i>	
Polyethylene glycol	1.5 g per kg per day,3-6 days
Magnesium citrate	< 6 years: 2 to 4 mL per kg per day6 to 12 years of age: 100 to 150 mL per day> 12 years: 150 to 300 mL per day
<i>Stimulants</i>	
Senna	2 to 6 years of age: 2.5 to 7.5 mL (8.8 mg per 5 mL); ½ to 1 ½ tablets (8.6 mg per tablet) per day6 to 12 years of age: 5 to 15 mL; 1 to 2 tablets per day
Bisacodyl	≥ 2 years: 5 to 15 mg (1 to 3 tablets) per day in a single dose
<i>Lubricants</i>	
Mineral oil	15 to 30 mL per year of age per day

**Maintenance therapy**

Maintenance therapy should be started immediately after disimpaction, to prevent re-impaction.<sup>37</sup> Parents should be advised to adjust the laxative dose according to response, and to increase the dose every two days until the child has one or two soft stools each day, or to decrease it if the patient develop diarrhea. Laxatives should be continued at least 2 months or all symptoms of constipation should be resolved for at least 1 month before discontinuation of treatment. Discontinuation of laxative may have done when there is passage of soft stool every one or two days without fecal incontinence. Doses and side effects of various laxatives are shown in table-VIII. It has been shown that lactulose, sorbitol, milk of

magnesia (magnesium hydroxide), and mineral oil (castor oil), all are equally effective in children. Milk of magnesia and mineral oil are unpalatable and due to the risk of lipoid pneumonia mineral oil is contraindicated in infants. The commonly used laxative in children so far was lactulose, until the introduction of polyethylene glycol (PEG). Low volume PEG has been compared with lactulose in the treatment of childhood functional constipation and a meta-analysis of five RCTs comprising of 519 children has shown that PEG was more effective than lactulose with equal tolerability and fewer side effects<sup>38</sup>. Bloating and abdominal pain are less with PEG than lactulose. With long term use, lactulose loses its efficacy due to change in gut flora but PEG does not.<sup>39</sup>



**Table-VIII**  
*Laxative–Dosage and side effects for maintenance therapy in children*<sup>16</sup>

Drugs	Dose	Side effects
Lactulose	1-2 g/kg, 1-2 doses	Bloating, abdominal cramps
Sorbitol	1-3 mL/kg/d, 1-2 doses	Same as lactulose
Milk of magnesia	1-3 mL/kg/d, 1-2 doses	Excess use leads to hypocalcemia, hypermagnesemia, hypophosphatemia
PEG	5-10 mL/kg/d or 0.4 to 0.8 g/kg/d	Nausea, bloating, cramps, vomiting
Mineral oil	1-3 mL/kg/d	Lipoid pneumonia, interference with absorption of fat soluble vitamins
Senna	2-6 yrs: 2.5-7.5 mL/day (8.8 mg/5mL) 6-12 yrs: 5-15 mL/d	Melanosis coli, hepatitis, hypertrophic osteoarthropathy, neuropathy
Bisacodyl (5mg)	0.5-1 suppository (10 mg) 1-3 tabs /dose	Abdominal pain, diarrhea, hypokalemia

### Prognosis

Parents should be informed that there is a risk of constipation recurrence in 50% of all cases. The prognosis for full recovery, defined as no soiling and no constipation while off medication, has been reported as 48% at 5 years follow up<sup>40</sup>. Half to two thirds of children with functional constipation had successful outcome with laxative therapy for 6 to 12 months but the remaining one thirds require long-term therapy<sup>16</sup>. Recurrence of constipation after initial recovery is common (50% may have relapse within a year of stopping therapy. but they respond well to retreatment<sup>8</sup>. Poor prognostic factors are; early onset (<4 years), associated with fecal incontinence and longer duration of symptoms (>6 months).<sup>21</sup>

If a child with constipation left untreated s/he may develop complications on Table 9.

- Pain: Anal or abdominal
- Anal fissure
- Encopresis
- Enuresis
- Urinary tract infection/ureteral obstruction
- Rectal prolapse/solitary ulcer
- Stasis syndrome
  - Bacterial overgrowth
  - Carbohydrate fermentation, maldigestion
  - Bile acid deconjugation
  - Steatorrhea
- Social exclusion/depression/anxiety

### Conclusion:

Constipation is common problem in children. Most of them are functional only few are due to organic causes. Functional constipation can be diagnosed by detailed history and relevant physical examination without laboratory investigations. Only if there are any alarming signs, we can do relevant investigations to exclude organic pathology. Management is to do disimpaction if fecal impaction present, then long term maintenance therapy along with behavioral therapy ensures full recovery.

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