PREVALENCE OF CONSTIPATION IN CHILDREN: ITS CAUSES IN RELATION TO DIET PATTERN AND PSYCHOSOCIAL ASPECTS

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ABSTRACT

Pediatric constipation is one of the common gastrointestinal conditions in children presenting with varying complains which are easy to detect from history, but the condition is often under diagnosed. It has significant impact on daily life troubling the children and their parents with complains like hard and painful defecation, abdominal pain, voluntary stool retention and blood in stool. Prevalence of constipation has been found in wide variation among studies from multiple western as well as Asian countries, but there are no studies from Nepal. This cross-sectional study was conducted at our center including children from 2-14 years of age presenting to pediatric OPD. Children were diagnosed by using ROME IV criteria for constipation and analyzed for demographic profile, presenting symptoms, socio-economic conditions, psychological aspects and dietary habits. Out of total 400 children, 127 (31.8%) had constipation with slight male predominance (M:F=1.2:1). Most constipated children had Bristol type I and type II stool with frequency ≤3 episodes per week. Most common complaint was passage of hard stool (88.2%) and painful defecation (52.8%). Outdoor toilet facility was one of the predisposing factors and aversion to use school toilet was the most common precipitating psychological factor. Increased fruits and vegetables intake reduced its incidence and predominant cow's milk intake increased it. Thus constipation is not an uncommon condition among Nepali children and it is associated with different feeding habits and psychosocial factors. The increased intake of high fiber diet along with availability of indoor toilets reduces the risk of constipation in children.

KEYWORDS

Constipation, Nepal, Bristol, high fiber

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INTRODUCTION

Constipation is a very common symptom in pediatric age group and a common gastrointestinal health problem.[1] It has significant impact on patient's quality of life and on health care resources. Constipation is a clinical entity that can be diagnosed based on the child's bowel habit, signs and symptoms and according to ROME IV criteria.[1] Constipation is typically characterized by lack of periodicity in defecating, bulky stools and difficulty or pain during defecation.[2] It is one of the ten most frequent problems that general pediatrician deals.[2] It forms 3% of all referrals to pediatric practice and upto 25% to pediatric gastroenterologists consultation worldwide.[2,3]

Constipation is one of the major cause of recurrent abdominal pain in children.[4] Often a medical history and physical examination are sufficient to diagnose functional constipation but still constipation is missed by the primary physician despite proper and adequate medical history.[5] In majority of cases, the symptoms of constipation are not found or are very subtle to be picked up for making the diagnosis.[4] Although many still believe that constipation is not a common disease, around 9.5% of the world's children suffer from chronic constipation.[6] There are major misconceptions that constipation is usually organic, whereas in reality majority of the cases are functional i.e. no specific cause is found in them.[6] Contrary to a commonly held belief that children outgrow constipation without long-term problems, there is evidence that constipation leads to significant bowel and psychological consequences and had a major impact on the quality of life which detrimentally affects future health and education.[6]

Until now, the pathophysiology of childhood functional constipation is not completely understood; the stool withholding behaviour that often occurs after a negative experience associated with stooling e.g. a hard, painful or frightening bowel movement has been considered an important etiological factor, causing the child to voluntarily or involuntary withhold bowel movements.[7] For the diagnosis of functional constipation the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) has published a joint guideline for the evaluation and treatment of functional constipation. This guideline recommends the use of ROME IV definitions which is the most recent recommendation.[8]

The Bristol stool scale[1], an evidence based tool is helpful to use with children and their parents to accurately determine the consistency of the child's stool.[8,9] Abdominal pain is one of the common symptoms of presentation in children with constipation which make them visit emergency department.[10] It has been found that in one-third of children presenting to emergency with abdominal pain, the symptom is caused by constipation.[10] Similarly, almost 80.0% of patients with constipation experience abdominal pain.[10]

Constipation is regarded as a symptom, not a disease and it presents with varied presentations. Some patients regard constipation as straining (52.0%), while for others, it means hard pellet-like stools (44.0%) or an inability to defecate when desired (34.0%), or infrequent defecation (33.0%).[11] In day to day practice around 10.0% of children present with constipation and 10.0% to 25.0% of referrals to gastroenterologists are for constipation only.[11]

The reported prevalence of constipation in children varies according to different studies but there is no similar study done till date in Nepal. This study aims to estimate the prevalence of constipation in children and adolescents presenting to pediatric OPD at Nepal Medical College Teaching Hospital (NMCTH), Kathmandu. Along with the prevalence, there are other factors which have been associated with constipation like, dietary, socio-economic and psychological factors, etc. Thus the intent of this study is not only to estimate the prevalence of functional constipation in our region but also to learn other associated factors which may help in the management of such children.

MATERIAL AND METHODS

This is a hospital based cross-sectional study in children presenting to pediatric OPD at NMCTH. Children with age group 2 to 14 years who visited pediatric OPD from October 2024 to March 2025 were included in the study, excluding those who were already taking medications for constipation. Ethical approval was taken from the Institutional Review Committee (IRC) of NMCTH (Ref. No.: 24-081/082). The cases presenting to the Department of Pediatrics and fulfilling the inclusion criteria were enrolled in the study.

Demographic profiles of those children were collected along with their symptoms, living conditions like type of family, area of residence, toilet location along with daily bowel habits, dietary habits, socio-economic

history (calculated by modified Kuppuswamy scale)[12] and psychological issues. Pattern of stool habit was documented by showing visual Bristol stool chart. Other factors associated with constipation were specifically asked and all data were recorded in a specially designed proforma by the pediatrician/doctor present at the OPD. After data collection was completed, all the data were entered and processed in Microsoft Excel and finally analyzed using SPSS-20. Analyzed data were presented as numbers and percentages. Statistical values were presented considering p <0.05 as significant.

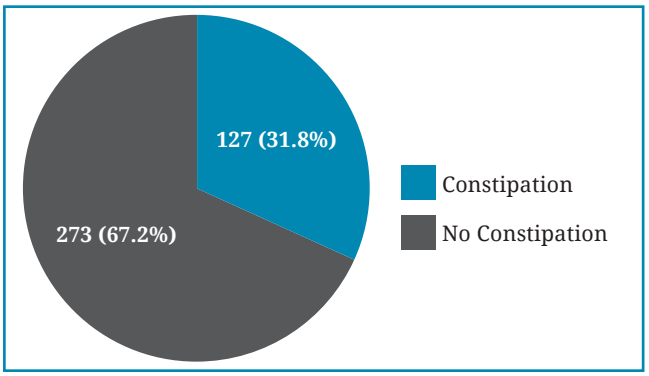

Fig. 2: Total children with and without constipation

RESULTS

During the study period, a total of 400 children who visited pediatric OPD for various reasons were included and their data were collected. Out of these 400, majority was male (56.0%) with a male to female ratio of 1.3:1. (Fig. 1) Among the studied children, a total of 127 (31.8%) were classified as functional constipation according to Rome IV criteria of which 70 (55.0%) were male and 57 (45.0%) were female (Fig. 2). Most common age group among constipated children was 2-5 years (44.0%) followed by 6-10 years (41.0%) and 11-14 years (15.0%) (Table 1).

Most of the children having constipation belonged to the nuclear family (71.7%) followed by joint family (25.2%) and separated family (3.1%) (Table 2). Out of 127 children with constipation, greater part consisted of children from urban area (77.2%). Constipated children were found more likely to using outdoor toilets (19.7%) as compared to non-constipated children (12.1%) and the relation was found to be statistically significant (p=0.045) (Table 2). Only 6.3% of children with constipation were vegetarian whereas 9.5% of children without constipation were vegetarian (Table 2).

Toilet trained children were 92.1% as compared to 7.9% of children who were not toilet trained in the constipation group, which was similar when compared with non-constipated group (92.3% and 7.7%). While comparing screen time, there was no significant difference, with majority of children having screen time more than 2 hours in both groups (78% vs. 83.5%) (Table 2).

On analyzing the frequency of stool passage in children, a higher proportion of children with constipation were passing stool once every 2

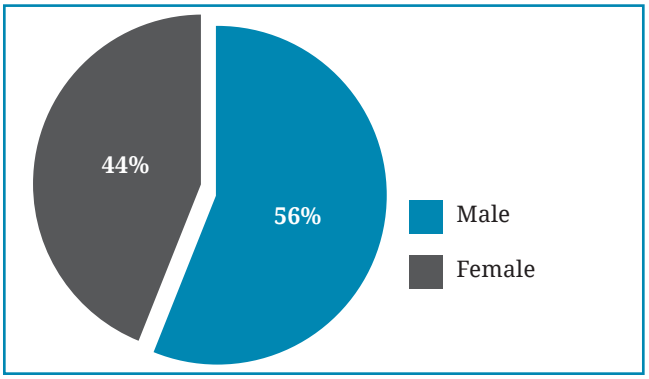

Fig. 1: Genderwise distribution of children included in the study

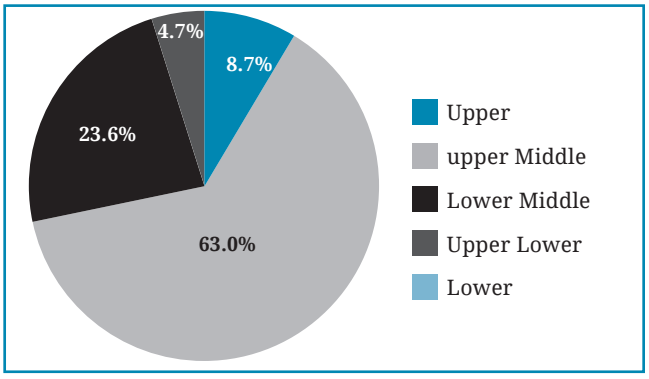

Fig. 3: Distribution of children with constipation as per socio-economic status

Table 1: Age and gender wise distribution of children with constipation

	Male	Female	Total
2-5 years	27	29	56 (44%)
6-10 years	32	20	52 (41%)
11-14 years	11	8	19 (15%)
Total	**70 (55%)**	**57 (45%)**	**127**

Table 2: Socio-demographic profile of children with and without constipation						
	Constipated (n=127)			Non-constipated (n=273)		
Type of family	**Nuclear n (%)**	**Joint N (%)**	**Separated n (%)**	**Nuclear n (%)**	**Joint n (%)**	**Separated n (%)**
	91 (71.7%)	32 (25.2%)	4 (3.1%)	212 (77.7%)	59 (21.6%)	2 (0.7%)
Residence	**Urban**	**Rural**		**Urban**	**Rural**	
	98 (77.2%)	29 (22.8%)		226 (82.8%)	47 (17.2%)	
Toilet location	**Indoor**	**Outdoor**		**Indoor**	**Outdoor**	
	102 (80.3%)	25 (19.7%)		240 (87.9%)	33 (12.1%)	
Food type	**Non-vegetarian**	**Vegetarian**		**Non-vegetarian**	**Vegetarian**	p-value
	119 (93.7%)	8 (6.3%)		247 (90.5%)	26 (9.5%)	0.045
Toilet trained	**Yes**	**No**		**Yes**	**No**	
	117 (92.1%)	10 (7.9%)		252 (92.3%)	21 (7.7%)	
Screen time	**<2 hours**	**>2 hours**		**<2 hours**	**>2 hours**	
	28 (22.0%)	99 (78%)		45 (16.5%)	228 (83.5%)	

Table 3: Bowel habits of children of constipation and no constipation group							
	Constipated (n=127)			Non constipated (n=273)			
Frequency of stool	**Once a day**	**Once in 2 days**	**< 3 times a week**	**Once a day**	**Once in 2 days**	**< 3 times a week**	p-value
	31 (24.4%)	67 (52.8%)	29 (22.9%)	120 (44%)	125 (45.8%)	28 (10.2%)	
Bristol chart	I	II	III	I	II	III	0.000
	12 (9.4%)	80 (63.0%)	31 (24.4%)	7 (2.6%)	44 (16.1%)	176 (64.5%)	

Table 4: Clinical profile of children with constipation	
Different types of complication	**n (%)**
Hard stool	112 (88.2)
Painful defecation	67 (52.8)
Recurrent abdominal pain	66 (52.0)
Large diameter stool	58 (45.7)
Taking longer than usual time to defecate	55 (43.3)
Fecal mass in rectum/fecal impaction	36 (28.3)
Blood streak stool	27 (21.3)
Fecal soiling/incontinence	9 (7.1)
Abnormal posture/Volitional stool retention	7 (5.5)
GERD/Reflux	7 (5.5)
Urinary symptoms	6 (4.7)
Vomiting	2 (1.6)

days (52.8%) or less than 3 times a week (22.9%) while non-constipated children were more likely to pass stool daily (p<0.05) (Table 3) .

Most of the children with constipation had Bristol type II stool (63%) while 9.4% had Bristol type I stool (p <0.05) (Table 3). Majority of the children with constipation belonged to upper middle socio-economic class (63.0%) (Fig. 3).

Most of the children having constipation had passage of hard stool (88.2%), as a major presenting complaint, followed by painful defecation (52.8%), recurrent abdominal pain (52.0%), and large diameter stool (45.7%) (Table 4). Although not clinically significant, aversion to use school toilet was the commonest precipitating factor (7.1%) associated with constipation in children (p=0.134). Only significant psychological factor associated with constipation in children was sibling rivalry (p=0.08) (Table 5).

Consumption of cow's milk as predominant food item in children was significantly associated

Table 5: Psychological factors seen in children with constipation N (%)			
Psychological factors	**With constipation**	**No constipation**	**p-value**
Aversion/unwillingness to use school toilet	9 (7.1%)	10 (3.7%)	0.134
Sibling rivalry	8 (6.3%)	4 (1.5%)	**0.008**
Marital disharmony	5 (3.9%)	5 (1.8%)	
Temper tantrum	5 (3.9%)	10 (3.7%)	
School phobia	5 (3.9%)	10 (3.7%)	

Table 6: Predominant Dietary pattern of patients with constipation n (%)			
Food items	**With constipation**	**Without constipation**	**p-value**
Cow's milk	43 (33.9%)	75 (27.5%)	**0.002**
Fried items	27 (21.3%)	58 (21.2%)	0.204
Vegetables	20 (15.7%)	133 (48.7%)	**0.000**
Fruits	15 (11.8%)	70 (25.6%)	**0.008**
Meat	11 (8.7%)	16 (5.9%)	0.128
Baked items	10 (7.9%)	28 (10.3%	0.167

with increased incidence of constipation in the study children as compared to those without constipation (33.9% vs. 27.5%; p=0.002)). While regular intake of fruits was associated with lower risk of constipation in children (11.8% vs. 25.6%; p=0.008). Similar significant association was seen with regular intake of vegetables in children which reduces the chance of having constipation than diet containing less vegetable (15.7% vs. 48.7%) (Table 6).

DISCUSSION

In the present study, a total of 400 children of age 2-14 years attending pediatric OPD were included and the overall prevalence of constipation was observed to be 31.8%. Our result was consistent with the study done by Kondapalli *et al*[11] at India which showed overall prevalence of 30.88% in children. Another study from Bihar, India by Vishal *et al*[13] had reported 38.45% children having constipation which was slightly more than our study. One of the studies from Korea by Park *et al*[14] revealed 8.5% constipation rate in children which was very low than our finding. Similar rate of 9% was reported a meta-analysis by Vesalco-Benitez *et al*[15] which had included studies from 15 different countries (including Asian and European countries). A systematic review published by Mugie *et al*[16] in 2011 revealed that children and adults residing in Asian countries had a lower constipation rates (median 10.8%), compared with those in North America (16.0%), Europe (19.2%), and Oceania (19.7%) which was contrasting to our finding of 31.8%. Same study had revealed only 0.7% prevalence rate in Italy which was the lowest rate in children upto 12 years of age.[16] Another systematic review and meta-analysis by Koppen *et al*[17] from 35 different studies around the globe reported nearly 9.5% of pooled prevalence of constipation worldwide (ranging from 0.5% to 32.2%). Makhwana *et al*[18] revealed 5.6% of Indian children presenting with constipation. One of the most recent study done in 2023 by Musali *et al*[19] found 17.1% of children with functional constipation among Indian population. Another study done in Japanese children by Fujitani *et al*[20] found constipation in 20.0% children. Ciampo *et al*[21] in their study from Brazil had reported 26.8% rate of constipation in children. Although a wide range of variation in prevalence rate of constipation was found from different studies, some studies from India has revealed higher proportion which was consistent with our study which could be due to similar geographic strata, cultural and dietary practices.

We found constipation was more prevalent in male children (55.0%) as compared to female (45.0%) male female ratio of 1.2:1, although the difference was not statistically significant. One of the study by Gannikau *et al*[11] found slight male preponderance in constipation. Almost equal proportion of male and female children had constipation in studies by Park *et al*[14] and Ciampo *et al*[21] Female predominance in constipated children was found in multiple studies done by Vishal *et al*[13] (1:1.6) and Rajindrajith *et al.*[22]

In our study we found an increased rate of constipation in children upto 5 years (Table 1) as compared to over 5 children but the difference was not significant statistically. Our findings were consistent with previous study done in India by Mugie *et al*[16] and Makhwana *et al*[18] which have reported lesser rates of constipation with increasing age. Similar findings were obtained by Kondapalli *et al*[11] (57.4% in 2-4 years), Vishal *et al*[13] (62.2% in 2-5 years) and Kokkonen *et al.*[23]

While comparing the residential background, a higher proportion of rural children had constipation when compared to urban children, though it was not statistically significant (Table 2). Similar finding was reported from an Indian study by Vishal *et al.*[13] and Benzamin *et al*[24] from Bangladesh. Unlike our finding Makhwana *et al*,[18] Walter *et al*[25] and Mazumder *et al*[26] from their studies reported higher prevalence of constipation in children from urban background. In this study the rate of constipation was significantly higher in children with outdoor toilet location with 19.7% constipation as compared to 12.1% in non-constipated group (p=0.045). Our finding was consistent with the studies by Vishal *et al*[13] and Musali *et al*[19] which reported similar higher rates of constipation as compared to children with indoor toilets.

We observed statistically significant (p <0.05) difference in the frequency of stool in children with or without constipation. In our study children with constipation were passing stool three or less than three times a week (75.7%) (Table 3). Similar findings were seen by Musali *et al*[19] and Bansal *et al.*[27] Likewise, Rezaianzadeh *et al.*[28] in their study have reported majority of children with constipation passing stool twice a week or less (63.7%).

Majority of children with constipation were passing hard stool (Type I in 9.4% and Type II in 63.0%) according to Bristol stool chart. The finding was statistically significant (p <0.05) when compared to non- constipated children who had majority of children with stool type III (64.5%). Our finding was comparable with previous study by Musali *et al*[19] which had reported 66.6% of children presenting with type I & II stool. Similar findings were seen in another study by Chang *et al.*[29], while Bansal *et al*[27] reported even higher portions with hard stool (85.26%). Kondapalli *et al*[11] in their study had contrasting result with no children presenting with type I stool and majority had Bristol type III stool (33.8%) followed by type II (8.4%).

In this study, most common presentation of constipation was presence of hard stool (88.2%) followed by painful defecation (52.8%) and our finding was consistent with previous study from Bangladesh by Benzamin *et al.*[24] Majority of previous studies had reported painful defecation as predominant symptoms in constipated children.[18,22] Similar major finding of pain during bowel movements was obtained in studies from north India (85.26%)[27] and another study from south India (81.4%).[19] A study from Korea obtained similar result hard stool and painful defecation as the major symptoms (60.0%).[29] These 2 major symptoms (stool consistency and painful bowel movements) are thus regarded as more sensitive parameters for diagnosis of constipation.[27]

Another major symptom was abdominal pain seen in 52.0% of constipated children in our study which was consistent with previous study by de Lorijn *et al*[30] which found 56.0% cases with abdominal pain as one of the major complaint. Other various studies have different findings such as 21.6% in Makhwana *et al*,[18] 47.4% in Benzamin *et al*,[24] 47.49% in Mazumder *et al.*[26] Another study from India by Bansal *et al*[27] had only 16.03% of children with pain in abdomen.

We got 45.7% constipated children presenting with large diameter stool which was almost similar to previous Korean studies, 47.6% by Ahn *et al*[31] and 38.9% by Park *et al.*[14] Other studies have reported large diameter stool in lesser percentages 25.6% by Musali *et al*[19] 21% by Fujitani *et al.*[20] Fecal impaction was found in 28.3% of constipation cases in our study unlike other previous studies which have reported higher rates of impaction in constipated children.[18,19,29]

Out of all constipated children, 21.3% of them also had history of blood in stool which was associated with hard stool and our finding was corroborating with the findings by Musali *et al*[19] (21.79%) and Vishal *et al*[13] (23.5%). Other studies have reported various findings as 10.8% (Kondapalli *et al*)[11] 13.8% (Makhwana *et al*)[18] and 7.7% (Benzamin *et al*).[24]

In our study fecal soiling or incontinence was seen in 7.1% of total constipated children which was much less than other studies 44.5% by Kondapalli *et al*,[11] 24.35% by Musali *et al*,[19] 46.3% by Fujitani *et al*,[20], 16.0% by Chang *et al*[29] and 54% by Ahn *et al.*[31] Similar study by Benzamin *et al*[24] got very less rate on fecal incontinence (2.6%) in constipated children.

Abnormal posture or excessive stool retention was found in only 5.5% of children from this

study which was comparable with study by Benzamin *et al*[24] which had reported 9%. In contrast to our study, other studies have reported higher rates (58.4%,[11] 42.85%,[13] 54.5%[19]).

Although unwillingness/aversion to use school toilet was the most common psychological factor associated with constipation (7.1%), it was not statistically significant. There were only few studies in the past analyzing the psychological factors associated with constipation in children. Previous studies by Kondapalli *et al*,[11] Makhwana *et al*[18] and Musali *et al*[19] also reported aversion of using toilet at school as the commonest associated factor identical to our study, but the rates were high (37.1%, 25.3% and 35.89% respectively). Only factor that was significant in our study was sibling rivalry (6.4%) when compared with non-constipated children (Table 5; p=0.008) Sibling rivalry was found in 24.3% by Kondapalli *et al*[11] and 16.1% by Makhwana *et al*.[18]

In our study we found predominant cow's milk consumption in children was associated with increased incidence of constipation (33.9%) and the finding was statistically significant. (p=0.002) The finding was consistent with another study by Mazumder *et al*[26] (32.9%). Another study by Musali *et al*[19] also found increased rate of constipation in children consuming more milk per day. Similar findings had been reported by Rajindranath *et al*,[32] Mulhem *et al*[33] and Nurko *et al*.[34]

Diet rich in fruits and vegetables was found to be associated with lower risk of constipation from our study (Table 6) and it was statistically significant ($p<0.05$). Majority of previous studies have consistent findings and diet low in fruits and vegetables have found to be associated with increased rate on constipation in children.[11,13,19,24,26] This finding could be due to high fiber content in fruits and vegetables which is beneficial in constipation by increasing the mass of fecal bolus, retaining water and increasing colonic bacteria, thereby increasing colon transit.[19,33,34] We got no significant difference in the prevalence of constipation in children with intake of meat, fried items or baked items. Other studies have reported significant association with increased intake of fried or baked items and increased prevalence of constipation.[11,13,24,26]

In conclusion, constipation in children is one of the major problems seen nowadays most probably due to various factors like dietary habits with increased use of junk and adulterated food items and other psychological factors. The prevalence of constipation in children from our study was 31.8% which is little higher than other studies, but is comparable with some studies done in India. It is one of the conditions which can be diagnosed by using the symptoms and signs in children using ROME IV criteria. We got constipation more in male children than females and living in a nuclear family made more children prone to constipation. Outdoor toilet facility was one of the significant factors that was associated with constipation. Majority of constipated children had irregular bowel habits passing three or less than three in a week and majority of children had Bristol type I and type II stool. Rather than frequency alone presenting complains like passage of hard stool, painful defecation, large diameter stool and abdominal pain are commonly found in children with constipation. Fecal soiling and volitional stool retention are some other less common symptoms. Aversion to school toilet and sibling rivalry was most common associated psychological factors. Predominant milk intake was found to be associated with increased risk of constipation in children and increased fruits and vegetables was protective against constipation. Thus more fiber rich diet with increased vegetables and fruits intake, availability of indoor toilets and improving the toilet conditions at school may help in overcoming the problem of constipation in children.

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