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Prevalence and Spectrum of Gastrointestinal Symptoms among School Children in South India: A Cross-Sectional Study.

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ABSTRACT

Gastrointestinal symptoms are amongst the most common symptoms in children in paediatric practice and its incidence is increasing worldwide. Very few studies of the prevalence of GI symptoms in children, especially community based, are available in India. We therefore wished to determine the burden of GI morbidity in children in the community setting. A self-structured, pretested questionnaire was used to gather the presence, duration, severity and impact of GI symptoms in school children from classes 1 to 10. 51.5% (203) out of 394 students developed GI symptoms over the preceding 3 months, of these 53.2% (108), had symptoms lasting over 2 months. Pain abdomen in 105 (26.7%) and Early satiety in 86 (21.8%) were the commonest symptoms. 55(64%) of all children with early satiety, and 22 (68.8%) of those with constipation had a chronic presentation, whereas diarrhoea 38 (95%), vomiting 55 (77.5%) and nausea 61 (83.6%) presented as more occasional symptoms. 122 (60.1%) children reported moderate to severe symptoms, 30 (14.8%) reported school absenteeism, in 28 (13.8%), activities of daily life was affected and 15 (7.4%) reported sleep disturbances. Out of these, a mere 26 (12.8%) sought medical help. Early satiety was more common in girls (p 0.0077). Analysis based on class of study, revealed nausea (p value of 0.0003), vomiting (p 0.01), early satiety (p 0.0004) and pain abdomen (p 0.009) to be higher in higher classes (6 to 10). The number of symptoms experienced per student was also higher in higher classes which was statistically highly significant (p close to 0). There is significant chronic GI morbidity in schoolchildren in the community, and affects multiple aspects of life, which needs to be addressed by the medical fraternity and policy makers.

Keywords: GI symptoms, pain abdomen, early satiety, vomiting, nausea, diarrhoea, constipation.

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INTRODUCTION

The burden of GI disorders is very high worldwide [1,2]. They form a significant cause of morbidity, mortality and economic burden to the individual as also the country's health infrastructure [2]. There is also an increasing trend of GI diseases world over, over the years [1,2].

Although there are a number of epidemiologic studies on the prevalence of GI diseases in adults and children, they have focussed on data from healthcare services, outpatient department or on specific symptoms pertaining to upper abdomen or lower abdomen, pain abdomen, constipation etc.

There is very little data on the prevalence of GI symptoms and its related morbidity in children in India, especially in the community backdrop. Few studies have shown low morbidity in India [3]. While few others have shown higher morbidity of diseases such as functional GI disorders (FGID) including constipation, dyspepsia etc. [4, 5] esp. in the western world. Substantial number of people with GI issues don't seek health care facilities and treatment using native herbs /alternate medicine is quite common [6]. In the community, there is a huge reservoir of persons who have GI issues, but a specific diagnosis is yet to be made by the physician [7]. In dyspepsia in adults, only 50% of the affected, actually consult a doctor [8] The true burden of GI illness in the general population of children is even less well documented. To the best of our knowledge, there are not many studies on GI symptoms in children in India, which are community based and focussed on both upper and GI symptoms like, pain abdomen, bloating, nausea, vomiting, dyspepsia, constipation and diarrhoea.

METHODS

After obtaining due permissions from the research committee and the ethical committee of our institution, an observational, cross sectional prevalence study was designed. All children from classes 1 to 10 from a private school of convenience were invited to participate in the study.

We used a self-structured pre-tested questionnaire, in which part 1 included demographic details of the child like age, sex, class of study, parents education and occupation. Part 2 consisted of GI symptoms such as nausea, vomiting, pain abdomen, early satiety, bloating, rumination, diarrhoea, indigestion, aerophagy, fecal incontinence and constipation which were noted during the past 3 months. The duration of the symptoms was classified as occasional if the child had rare symptoms in the last 3 months up to a maximum of 10 episodes, the 2nd group consisted of children who had frequent or persistent symptoms, at least more than once a week for up to 2 months, the 3rd group of children were those with at least, weekly symptoms lasting over 2 months duration. Self-perceived severity of symptoms was classified as mild, moderate or severe. impact on the daily activities, school attendance and sleep was documented, and also visit to a doctor was recorded. For the primary classes (class 1-5) the questionnaire was applied to mothers over phone, by doctors and from classes 6-10, the questionnaire was applied to children themselves by doctors. All the data collectors were pre-trained to ensure uniformity of data collection and pilot testing of the questionnaire was done. Due permissions were also obtained from the school authorities. Appropriate consent /assent was obtained from the concerned parents and children.

Inclusion Criteria: Children from classes 1 to 10 of a semi-rural private school.

Exclusion Criteria: Children with chronic major ailments like 1) previously established GI disorders like inflammatory bowel disorders, 2) malignancies, 3) children on chronic long-term medication for various ailments and 4) children with history of major GI surgery.

Statistical Analysis

All the data was entered in excel and analysis was done using SPSS software version 20.0. Results were drawn and displayed in terms of percentages and frequencies. Significance was analysed using chi-square test.

RESULTS

A total of 394 students from classes 1 to 10 participated in the study. 203 girls and 191 boys were enrolled, 73 from classes 1 to 5, 321 from classes 6 to 10. Mean age of girls was 11.6 and of boys 11.3 years.

50% of parents had completed at least graduation. Most fathers were employed as skilled workers including professionals (78.4%), whereas most mothers were home makers (68%). (table 1)

Of the 394 students enrolled, 191 (48.4%) had no symptoms over the last three months. 203, (51.5%) recalled at least one symptom over the last three months. Of these, 44% had occasional symptoms (less than 10 episodes in last three months, usually < 2-3 / three months), 2.5% had symptoms lasting 1 to 2 months and 53.2 % had chronic symptoms lasting longer than two months. (table 2)

The commonest symptoms noted were, Pain abdomen in 105 (26.7%), Early satiety in 86 (21.8%), Vomiting in 73 (18.53%), Nausea in 71 (18.02%), Diarrhoea was noted in only 40 (10.15%) and Constipation in only 32(8.12%) of all students who participated in the study.(fig 1)

40 students (38%) with pain abdomen had chronic symptoms lasting more than 2 months. However early satiety had a more chronic presentation with 55 (64%) having had symptoms lasting greater than two months, as also, of 32 children with constipation 22 (68.8%) had chronic symptoms, Whereas 61 (83.6%) with vomiting and 55 (77.5%) with nausea and 38 (95%) with diarrhea had a more occasional presentation.

Of 108 children, who had persistent symptoms greater than two months, 33 (30.5%) had symptoms less than 6 months. 23 (21.3%) had symptoms lasting close to one year. 12 (11%) had symptoms upto two years and a majority of 40 children (37%) had symptoms over two years. Some of these children complained of symptoms since early childhood, longest duration noted was 8 years.

Pain abdomen being the commonest symptom, 40 reported pains over two months. Upper abdomen pain was noted in 13 (31%), Lower abdomen 13 (31%), Peri umbilical pain in 10 (28.3%), Diffuse pain in 6 (14.3%). Two of these complained of both upper abdomen pain at times and diffuse pain at times.

Analysis of severity of symptoms revealed 90 (44.3%) children reported their symptoms to be of moderate severity, 32(15.8%) as severe. 30 (14.8%) reported school absenteeism, in 28 (13.8%), activities of daily living was affected and 15 (7.4%) reported that sleep was disturbed by the symptoms. Out of these, a mere 26 (12.8%) sought medical help.

Of 203 children with symptoms 73 (36%) reported only one symptom, 52 reported 2 (25.1%), and 36 (17.7%), three symptoms. 43 (21.2%) reported ≥ 4 symptoms. (fig2)

160 (78.8%) reported three or fewer symptoms. Maximum reported number of symptoms was 9.

An analysis of symptoms based on gender revealed that early satiety was common in girls (p value 0.0077). Aerophagy (p value 0.033) bloating sensation [0.013] in the abdomen was more commonly reported in boys, however the number of students in this group was small. (table 3)

When symptoms were analysed based on class of study, nausea (p value of 0.0003), early satiety (p value of 0.0004), vomiting (p value 0.01) and pain abdomen (p value of 0.009) was higher in classes 6 to 10. Bloating [0.03] and indigestion (p value 0.01), were also experienced with higher frequency in classes 6 to 10 as compared to junior classes, between 1-5 though number of children manifesting these symptoms was small (table 4).

Also, the presence of symptoms and also the number of symptoms was higher in higher classes. After normalization of values for higher and lower classes, 233 children in lower classes vs 138 in higher classes had no symptoms. 39.6 vs 64 had one symptom, 35.18 vs 43 had two symptoms, 8.8 vs 34 had

three symptoms, 4.4 vs 42 had 4 or more symptoms. This was highly significant with a p value nearing 0(fig 3)

Table 1: Socio Demographic Profile of students

S.no	Variable	Fathers	Mothers
	Education	No.(%)	No.(%)
1	Graduation and above	207 (52.53)	200 (50.8)
2	Higher secondary schooling /diploma	98 (24.9)	108 (27.4)
3	Some schooling	61(15.5)	60 (15.2)
4	Illiterate	2[.5]	2 [.5]
5	Data NA	26 (6.5)	24 (6)
	Occupation	No.(%)	No. (%)
1	Professionals	53 (13.4)	9 (2.5)
2	Skilled	255 (64.7)	96 (24.3)
3	Semiskilled	73 (18.5)	13 (3.3)
4	Unskilled	3 [.8]	4 (1)
5	Unemployed/ homemaker	2 [.5]	268 (68)
6	Data NA	8 (2)	4 (1)
Age and sex distribution of students			
	Age	Female No.(%)	Male No. (%)
1	6-8 years	29(7.3)	34(8.6)
2	9-11 years	69 (17.5)	33 (8.4)
3	12-14 years	97 (24.6)	108 (27.4)
4	15-16 years	8 (2)	16 (4.1)
	Total	203 (51.5)	191 (48.5)

Table 2: Common Gastrointestinal Symptoms in Students (Total 203)

S.No	Symptom	Occasional No (%)	1 to 2 months No (%)	>2 months No (%)	Total
1	Pain abdomen	63 (60)	2(1.9)	40 (38.1)	105
2	Early satiety	29(33.7)	2 (2.3)	55 (64)	86
3	Vomiting	61 (83.6)	2 (2.7)	10 (13.7)	73
4	Nausea	55 (77.5)	1 (1.4)	15 (21.1)	71
5	Diarrhoea	38 (95)	0 []	2 (5)	40
6	Indigestion	27 (73)	0[]	10 (27)	37
7	Constipation	8 (25)	2 (6.3)	22 (68.8)	32
8	regurgitation	16 (59.3)	2 (7.4)	9 (33.3)	27
9	Bloating	14 (66.7)	0 []	7 (33.3)	21
10	Aerophagy	4 (50)	0 []	4 (50)	8
11	Fecal incontinence	1 (100)	0 []	0 []	1

Table 3: Association of Symptoms noted Versus Gender of the child

S. No.	Symptom	Female No. (%)	Male No. (%)	p value
	Total Students	203 (100)	191(100)	
1	Vomiting	40 (20)	33 (17)	0.3293
2	Nausea	40 (20)	31(16)	0.2669
3	Rumination	12 (6)	15 (8)	0.2983
4	Indigestion	17 (8)	20 (10)	0.3094
5	Diarrhoea	18 (9)	22 (12)	0.273
6	Constipation	21 (10)	11 (6)	0.0997
7	Early satiety	56 (28)	30 (16)	0.0068
8	Pain abdomen	57 (28)	48 (25)	0.3206
9	Aerophagy	1 (])	7 (4)	0.033
10	Bloating	5 (2)	16 (8)	0.013
11	Fecal Incontinence	1 (])	0 (])	0.249

Table 4: Association of Symptoms noted Versus Class of study of the child

S. No.	classes	1 to 5 No. (%)	6to 10 NO.(%)	P Value
	Total Students	73	321	P Value
1	Vomiting	6 (8)	67 (21)	0.017
2	Nausea	2 (3)	69 (21)	0.0003
3	Rumination	1 (1)	26 (8)	0.0484
4	Aerophagy	0 (])	8 (2)	0.1576
5	Indigestion	1 (1)	36 (11)	0.0135
6	Bloating	0 (])	21 (7)	0.032
7	Diarrhoea	4(5)	36 (11)	0.1365
8	Constipation	7 (10)	25 (8)	0.3506
9	Fecal Incontinence	0 (])	1 (])	0.356
10	Early satiety	4 (5)	82 (26)	0.0004
11	Pain abdomen	10 (14)	95 (30)	0.0085

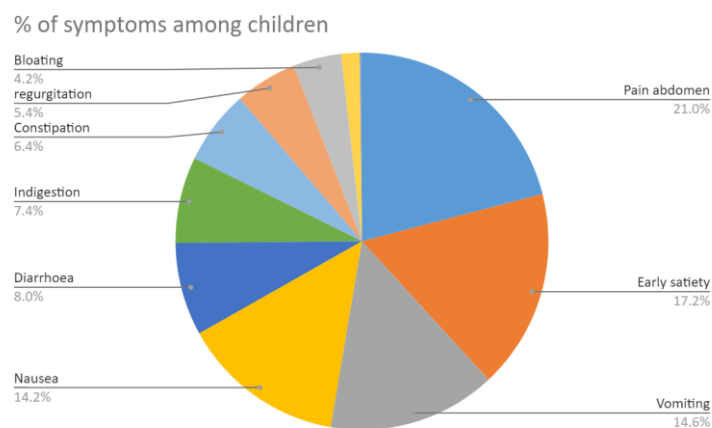


Figure 1

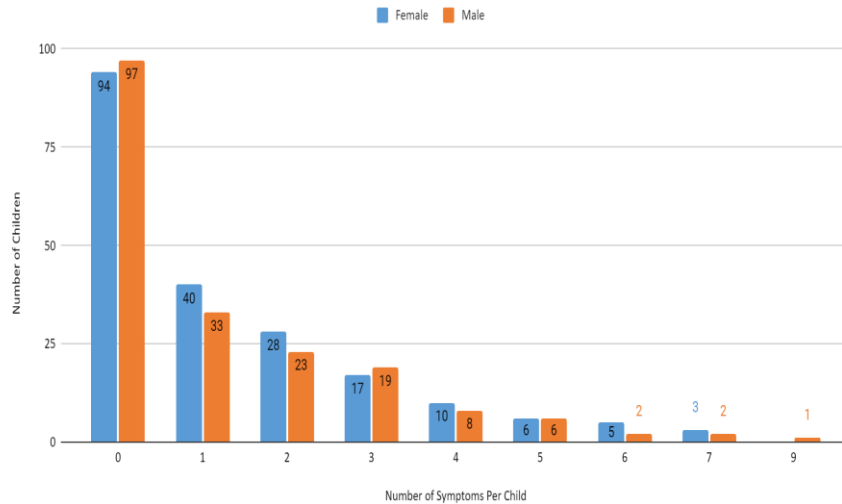


Figure 2 Number of symptoms noted / child (394)

Discussion

There appears to be sparse data on the prevalence of GI symptoms, especially in children, except possibly pain abdomen and constipation, although there is considerable data on functional gastrointestinal disorders. Even more significant is the non-availability of community based prevalence studies about GI symptoms in Indian children.

To the best of our knowledge, our study is one of a few studies attempted to gather detailed description of GI symptoms, pertaining to both upper and lower abdomen in children, the epidemiology, nature of presentation, its severity and impact on children in the community.

Our results show that more than half the children develop at least one GI symptom in the last three months. Multiple studies have shown diverse results. Jody Porter reported 80% GI symptoms in last six months [9], While Samar Ibrahim showed a cumulative incidence of 72.2% of GI symptoms, in an 18 year follow up [10]. A Japanese study which included both adults and children, reported 25% incidence in one month [6]. Saps, in a prospective community based study in children, showed a 60% incidence of GI symptoms in a 16 week period[11].

This variable prevalence may be due to cultural behaviour, variable eating habits and methodologic differences of different studies.

The most frequent symptoms we noted in the order of decreasing frequency were, pain abdomen (26.7%), early satiety (21.8%), vomiting (18.5%) and nausea (18%).

Numerous studies have reaffirmed that pain abdomen is the most common GI symptom, in both the community and office practice. A Japanese study by Tokuda.Y et al [6] revealed an incidence of 27.7% pain abdomen, being the commonest in their study also. Other symptoms in decreasing order of frequency were diarrhoea, nausea, constipation and dyspepsia. Jody Porter showed pain in 60% followed by diarrhoea, nausea and constipation. Saps [11] reported an incidence of pain abdomen in 46% other common symptoms in his study were nausea, constipation and diarrhoea.

In our series approximately one third reported lower abdomen pain, one third upper abdomen pain and one fourth reported periumbilical pain. About 15% had diffuse pain abdomen. In the Raine study approximately 50% had lower abdomen pain, 37% had peri umbilical pain and only 13% reported upper abdomen pain [12].

We noted that the prevalence of constipation was 8% as against 18% in Saps [11], 26%, by Jody Porter, in her series. However, a Japanese study [6] reported constipation in only 2%. Wide range of prevalence of constipation 0.7% - 29.6% has been reported in systematic review by Van den Berg [13]

The possible lower prevalence of constipation in our study as compared to western data may be due to predominantly homemade food intake. Though processed, junk food and eating out is increasing alarmingly, the staple diet of an average child in our background seems to be home cooked, relatively fiber rich diet.

When we analysed the relationship of sex of the child vs GI symptoms we noted that early satiety was more common in girls (p value 0.009). Bloating sensation (p value 0.013) and aerophagy (p value of 0.033) was more common in boys, however the number of children reporting these 2 symptoms were small and the significance of this result is not clear. For all other symptoms there was no significant difference based on gender.

Many studies in adults have demonstrated a preponderance of GI symptoms in women [14,15]. However most studies in children have not shown significant gender differences in the presentation [16, 17].

Constipation has been studied extensively and no significant difference exists between boys and girls in most studies [13].

On analysis of symptoms based on age, clearly older children from classes 6-10, presented with more symptoms. Vomiting (p value 0.01), nausea (p value 0.0003), early satiety (p value 0.0004), pain abdomen (p value 0.0085) were all significantly higher in classes 6-10. Bloating (p value 0.03) and indigestion (p value 0.01) were also more in higher classes but these 2 symptoms were reported by very few children. Higher classes also had multiple symptoms as compared to lower classes which was very highly significant (p value nearing 0). Hyams also reported more symptoms in older classes Pain abdomen 14% in high school vs 6% in middle school, IBD symptoms 17% in high school vs 8% in middle school children [18].

The reasons for this could be due to any or all of the following:

The gradual progression of symptoms with age. The inability of smaller children to communicate these subjective complaints to parents. Parental perception of symptoms is influenced by child's ability to attend school and its effects on child's daily activities and on sleep. Self-reported symptoms from older children are accepted as the gold standard. They are able to communicate multiple symptoms, especially nausea, early satiety and pain, much better than younger children. Vomiting, diarrhoea and constipation are more obvious to parents and therefore no significant difference of reporting these symptoms was noted.

In adults however, more symptoms were reported by younger than older participants in a Japanese study [6]. They showed older participants suffered more pain abdomen, dyspepsia, constipation, abdominal fullness and heart burn. Younger individuals reported more diffuse pain abdomen, diarrhoea, nausea and vomiting.

Of those with symptoms around 44% reported occasional symptoms usually less than 2- 3 in the last three months. However a significant majority 53% reported persistent symptoms lasting more than 2 months.

Of these, constipation 68% and early satiety 64% were the most chronic. However diarrhoea 5%, vomiting 13% and nausea 11% was predominantly reported as occasional symptoms.

Of those with symptoms more than 2 months, one third had symptoms upto 6 months, one fifth had symptoms between 6 months to one year, and significant 37% had symptoms over two years. This suggests that, sizeable long duration morbidity due to GI illnesses in the children exists in the community, which needs to be further explored and addressed by health policy makers.

Of 203 children with symptoms, 60.1% reported symptoms of at least moderate to severe nature. 14.8% children reported school absenteeism, in 13.8% daily activities were limited, in 7.4% sleep was disturbed, only 12.8% of these sought allopathic help. Hyams in his study reported that activities were affected in 21% of the children and 8% sought medical help [18], Jody Porter reported severe pain in 5% of her series. Saps in his school study in South America reported, in 21.9% daily activities were affected, school in 17.3%, sleep in 13.7%. 8.4% sought medical help [19].

This re-emphasizes the seriousness of childhood GI issues in the community which is not reflected in the data from office practice.

Strengths of the study

- Many studies are focussed on specific symptoms like constipation, pain abdomen or on specific group of symptoms, relating to upper abdomen, lower abdomen, or specific diseases IBD, GERD, etc. Very few are focussed on overall GI symptomatology, of both upper and lower abdomen, more so in children. Our study focused on an overview of symptoms pertaining to both upper and lower abdomen.
- Few such community-based studies in children are available as against office-based studies which are more prone for selection bias and abstraction bias and it also ignores significant morbidity in the community level.
- Not many studies have analysed details of duration of symptoms. We analysed it, to better understand the complexities of GI morbidity and chronicity.
- Data was extracted by doctors, which will improve validity of the study.

Limitations

- It is an observational study based on recall hence cannot ascribe causality
- It is self reported /parent reported and therefore subjective.
- Recall bias is an important factor, studies have shown lower recall than the actual illness in children and adolescents.

What is known?

- GI symptoms are common in office practice.
- Pain abdomen is the commonest GI symptom.
- It is associated with severity, affects school attendance, daily activities, sleep.

What the study adds?

- GI symptoms in children are very common in the community also.
- Early satiety is a very common chronic symptom noted in these children which has not been explored much previously.
- Significant levels of GI morbidity and severity exist in the community which needs to be addressed.

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