

Evaluation of familial aggregation, vegetable consumption, legumes consumption, and physical activity on functional constipation in families of children with functional constipation versus children without constipation

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Abstract

Introduction: Constipation is a frequent complication in paediatrics. Most of the constipation is functional. Functional constipation constitutes 25% of visits in paediatric gastroenterology clinics. Two studies were published regarding aggregation or clustering of functional constipation. Only one of these research projects was about a paediatric population.

Aim: To elucidate the cluster pattern of constipation among the families of children with constipation.

Material and methods: This case-control study was carried out on the families of 37 children < 18 years old with chronic functional constipation and the families of 37 healthy children as controls. Cases were enrolled in the study according to Rome III criteria for constipation. The control group was selected from children < 18 years old who visited the well baby clinic of the university. Parents and siblings were evaluated regarding constipation. Rome II and III were used for evaluation of constipation for adults and children, respectively. Data was analysed using SPSS (Chicago, IL, USA). The χ^2 and *t*-test were used for comparison.

Results: Physical activity and vegetable consumption were seen more frequently in the control group compared to the cases, but these differences were statistically insignificant. Constipation in mothers was significantly higher in the case group compared to the control group (*p* = 0.015). There was no significant difference between the two groups regarding exercise and vegetable consumption.

Conclusions: The frequency of constipation among mothers was significantly higher in the case group compared to the control group. Another study is recommended in a larger population for evaluation of genetic background, diet, physical activity, and familial clustering among mothers of children with constipation.

Introduction

Constipation is a frequent complication in paediatrics. Most of the constipation is functional. In other countries, the prevalence of constipation was reported at approximately 15.4–30%. In a recent study, the prevalence of constipation was estimated at about 1.9–27.2% in the general population in the US [1]. Functional constipation constitutes 25% of visits in paediatric gastroenterology clinics [2].

Several studies have been published about familial clustering or aggregation of gastrointestinal problem [3]. Some evidence suggests that there is a cluster pattern in the families of children with constipation. Two studies were published regarding aggregation or clustering of functional constipation [4, 5]. Only one of these publications was about a paediatric population [5]. A study by Chan *et al.* compared the families of persons with constipation with normal persons. They found sub-

jects with more family having constipation will have higher risk of constipation compared to people with just one or two family members [4]. In the Borowitz *et al.* study, family history of constipation in parents or siblings of constipated children was similar to that of normal children [6]. These studies were carried out in the USA [4, 6]. There has been no published research on familial clustering or aggregation of constipation in Asian countries.

Aim

The aim of this study was to find a cluster pattern of constipation among families of children with constipation versus families of normal children.

Material and methods

This case-control study was carried out on the families of 37 children with constipation as cases, and on the families of 37 healthy children without constipation as controls. The place of study was the Imam Reza clinic of Shiraz University of Medical Sciences. The children's families were evaluated regarding constipation. Each of the families were asked about physical activity of more than 20 min per day on at least 3 days per week, and vegetable and legumes consumption as serving per week. All children and their families had normal patterns of water drinking in their history.

Exclusion criteria for probands was age < 6 months or age > 18 years; history of divorce or separation in family; and history of metabolic, organic, or endocrine disorder. Informed consent was signed by participants. Questionnaires were filled in by parents for siblings aged < 18 years and by siblings with age > 18 years.

Rome II criteria were used for defining constipation in adults. Rome II criteria are as follows: At least 12 weeks, which need not be consecutive, in the preceding 12 months of two or more of the following: (1) straining >1/4 of defecations; (2) lumpy or hard stools > 1/4 of defecations; (3) sensation of incomplete evacuation > 1/4 of defecations; (4) sensation of anorectal obstruction/blockage > 1/4 of defecations; (5) manual manoeuvres to facilitate > 1/4 of defecations (e.g., digital evacuation, support of the pelvic floor); and/or (6) < 3 defecations per week. Loose stools are not present, and there are insufficient criteria for irritable bowel syndrome (IBS).

Rome III criteria were used for the children with constipation. Rome III criteria are as follows: neonates and toddlers [7]: at least two of the following symptoms must occur for at least 1 month; < two defecations per week; > one episode per week of incontinence after the acquisition of toileting skills; history of excessive stool retention; history of painful or hard bowel move-

ments; presence of a large faecal mass in the rectum, and history of large-diameter stools that may obstruct the toilet. Children and adolescents [8]: 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 one episode of faecal incontinence per week; history of retentive posturing or excessive volitional stool retention; history of painful or hard bowel movements; presence of a large faecal mass in the rectum; history of large-diameter stools that may obstruct the toilet.

The sample size was calculated by Power SSC software ($\alpha = 0.05$, Power = 95%, P case = 38%, P control = 8%). For data collection, questionnaires were designed according to Rome III and Rome II criteria for children and adults, respectively.

Statistical analysis

Data was analysed using SPSS version 13.0 (Chicago, IL, USA).

Results

Seventy-four parents were included in each group separately. The numbers of siblings were 21 and 23 for case and control groups, respectively. The total numbers of families in cases and controls were 95 and 97, respectively.

The sensation of incomplete evacuation for at least 25% of defecations was significantly more frequent in mothers of children with constipation compared to mothers of normal children ($p = 0.001$). There was no significant difference between fathers in the two groups regarding positive criteria for functional constipation. There was no significant difference between two groups regarding other criteria (Table I).

There was no significant difference between other children of families of case groups compared to control groups regarding criteria of constipation (Table II).

In the case group, 10 (27%) of fathers had constipation versus 11 (29.7%) fathers in the control group ($p = 0.796$). Of all mothers in the case group 18 (48.6%) had constipation, which was significantly higher than the 8 (21.6%) mothers in the control group ($p = 0.015$). There was no significant difference between the two groups regarding constipation in the first child (case 6 (40%) vs. control 10 (55.6%), $p = 0.373$) (Table III).

Vegetable consumption was significantly higher among mothers of controls compared to the case group ($p = 0.045$). In total, vegetable consumption was significantly higher in the control families compared to case families.

Table I. Frequency of criteria of constipation among parents of children with constipation compared to parents of normal children

Criteria	Father			Mother		
	Case, n (%)	Control, n (%)	Value of p	Case, n (%)	Control, n (%)	Value of p
Lumpy or hard stool in at least 25% of defecations	14 (37.8)	17 (45.9)	0.48	19 (51.4)	20 (54.1)	0.816
Sensation of incomplete evacuation for at least 25% of defecations	10 (27)	13 (35.1)	0.451	18 (48.6)	5 (13.5)	0.001
Sensation of anorectal obstruction/blockage for at least 25% of defecations	9 (24.3)	8 (21.6)	0.782	10 (27)	5 (13.5)	0.148
Manual manoeuvre to facilitate at least 25% of defecations	5 (13.5)	1 (2.7)	0.088	6 (16.2)	2 (5.4)	0.134
Fewer than 3 defecations per week	4 (10.8)	1 (2.7)	0.165	4 (10.8)	2 (5.4)	0.394

Table II. Frequency of criteria among other children of the probands' family compared to normal children's family

Criteria	Child 1			Child 2			Child 3		
	Case n (%)	Control n (%)	Value of p	Case n (%)	Control n (%)	Value of p	Case n (%)	Control n (%)	Value of p
Number of defecations per week	3 (20)	5 (27.8)	0.604	1 (25)	0 (0)	0.285	1 (50)	0 (0)	0.386
Positive history of faecal soiling	3 (20)	6 (33.3)	0.392	1 (25)	0 (0)	0.285	1 (50)	0 (0)	0.386
History of large diameter faeces	5 (33.3)	6 (33.3)	1	1 (25)	0 (0)	0.285	1 (50)	0 (0)	0.386
Positive history of faecal withdrawal	4 (26.7)	8 (44.4)	0.29	0 (0)	0 (0)	–	1 (50)	0 (0)	0.386
Positive history of pain during defecation	2 (13.3)	6 (33.3)	0.182	0 (0)	0 (0)	–	0 (0)	0 (0)	–
Positive history visible blood on the stool	0 (0)	2 (11.1)	0.183	0 (0)	0 (0)	–	1 (50)	0 (0)	0.386

Table III. Frequency of constipation among families of cases compared to controls

Relative	Case, n (%)	Control, n (%)	Value of p
Father	10 (27)	11 (29.7)	0.796
Mother	18 (48.6)	8 (21.6)	0.015
1 st child	6 (40)	10 (55.6)	0.373
2 nd child	1 (25)	0 (0)	0.285
3 rd child	1 (50)	0 (0)	0.386
Number of families with at least one child with constipation	6 (40)	10 (55.6)	0.373
Number of families with at least one parent with constipation	24 (64.9)	16 (43.2)	0.062
Total number of children with constipation	8 (38.1)	10 (43.5)	0.717
Total number of parents with constipation	28 (37.8)	19 (25.7)	0.112
Total number of subjects with constipation	36 (37.9)	29 (29.9)	0.242

Table IV. Vegetable and legumes consumption between families of cases versus families of controls

Relative		Daily		Three times/week		One time/week		Rarely		Value of <i>p</i>
		Case <i>n</i> (%)	Control <i>n</i> (%)	Case <i>n</i> (%)	Control <i>n</i> (%)	Case <i>n</i> (%)	Control <i>n</i> (%)	Case <i>n</i> (%)	Control <i>n</i> (%)	
Father	Vegetables	4 (10.8)	9 (24.3)	14 (37.8)	17 (45.9)	14 (37.8)	7 (18.9)	5 (13.5)	4 (10.8)	0.199
	Legumes	2 (5.4)	2 (5.4)	13 (35.1)	16 (43.2)	14 (37.8)	12 (32.4)	8 (21.6)	7 (18.9)	0.912
Mother	Vegetables	6 (16.2)	10 (27)	11 (29.7)	18 (48.6)	11 (29.7)	7 (18.9)	9 (24.3)	2 (5.4)	0.045
	Legumes	2 (5.4)	3 (8.1)	12 (32.4)	17 (45.9)	15 (40.5)	12 (32.4)	8 (21.6)	5 (13.5)	0.554
1 st child	Vegetables	1 (7.7)	1 (5.6)	4 (30.8)	9 (50)	4 (30.8)	3 (16.7)	4 (30.8)	5 (27.8)	0.704
	Legumes	2 (15.4)	2 (11.1)	4 (30.8)	7 (38.9)	6 (46.2)	4 (22.2)	1 (7.7)	5 (27.8)	0.368
2 nd child	Vegetables	0 (0)	1 (25)	0 (0)	3 (75)	2 (50)	0 (0)	2 (50)	0 (0)	0.046
	Legumes	0 (0)	1 (25)	1 (25)	2 (50)	2 (50)	0 (0)	1 (25)	1 (25)	0.343
3 rd child	Vegetables	–	–	0 (0)	1 (100)	1 (100)	0 (0)	–	–	0.157
	Legumes	–	1 (100)	–	–	1 (100)	–	–	–	0.157
Total	Vegetables	11 (12)	21 (21.6)	29 (31.5)	48 (49.5)	32 (34.8)	17 (17.5)	20 (21.7)	11 (11.3)	0.002
	Legumes	6 (6.5)	9 (9.3)	30 (32.6)	42 (43.3)	38 (41.3)	28 (28.9)	18 (19.6)	18 (18.6)	0.178

There was no significant difference between families of cases and controls in terms of legumes consumption (Table IV). There was no significant difference between families of cases and controls regarding physical activity (Table V).

Discussion

There was no difference between the two groups regarding the prevalence of constipation in families

Table V. Physical activity among families of cases and controls

Relative	Case <i>n</i> (%)	Control <i>n</i> (%)	Value of <i>p</i>
Father	15 (40.5)	18 (48.6)	0.482
Mother	7 (18.9)	10 (27)	0.407
1 st Child	8 (53.3)	11 (61.1)	0.653
2 nd Child	1 (25)	3 (75)	0.157
3 rd Child	0 (0)	1 (100)	0.083
No. of families with at least one athlete child	8 (53.3)	11 (61.1)	0.653
No. of families with at least one athlete parent	18 (48.6)	20 (54.1)	0.642
All children are athletes	9 (42.9)	15 (65.2)	0.137
Total number of athlete parents	22 (29.7)	28 (37.8)	0.297
Total number of athletes	31 (32.6)	43 (44.3)	0.096

of children except in their mothers. In the study by Ostwani *et al.* the prevalence of constipation in families of children with constipation was significantly higher than in the controls [5]. In previous studies, the frequency of constipation was significantly higher among families of children with constipation compared to normal children [6, 7]. Their findings suggested genetic or environmental factors, which may be present among the families of children with constipation. Previous studies were carried out in the USA. Diet, genetic background, and physical activity may play a role in the different findings between two countries. However, in the study by Borowitz *et al.*, which was carried out in the USA, there were no significant differences between constipated children and normal children in terms of parents with history of constipation (30% vs. 40%, $p = 0.141$) or siblings (17% vs. 14%, $p = 0.15$) with history of constipation [6]. This controversy should be elucidated in future research.

Of the 21 siblings in the case group, 8 (38.9%) had constipation. Of the 23 siblings in the control group, 10 (43.48%) had constipation. The frequency of constipation among siblings of children with constipation (17%) and children without constipation (14%) was higher than that seen in the study by Borowitz *et al.* [6].

The frequency of constipation among parents was 24.32% (18 of 74) and 25.67% (19 of 74) for the case and control groups, respectively. Rate of constipation was higher in the study by Borowitz *et al.*, which was 30% for parents of constipated children and 40% for parents of normal children [6]. In the study by Ostwani

et al. the frequency of constipation among parents of constipated children was 42% and for children without constipation it was 9%. There was a significant difference in the Ostwani *et al.* study [5].

This high frequency of constipation in our study may play a role in the insignificant findings with our sample size. In addition, the correct prevalence of constipation in our country remained unclear.

We included 37 families of children with constipation and 37 families of children without constipation. But in the study by Ostwani *et al.*, a total of 112 children and their families were included [5]. However, genetic background and nutritional factors may also be important.

Vegetable consumption was significantly higher in families of controls compared to families of cases. Other studies support the beneficial effect of vegetable consumption on constipation [8].

There was no significant difference between the two groups regarding physical activity. Other studies showed a protective effect of exercise on constipation in adults [9]. In our study there was no significant difference between the two groups of families regarding prevalence of constipation, and this may be due to similarity in physical activity.

The place of sample collection in our study was the specialised paediatric gastroenterology clinic of the university. But in the study by Ostwani *et al.*, samples were collected from different clinics [5]. This difference may explain the difference between the two studies. Several factors such as ethnicity, life style, weather, and nutrition may play role in constipation in families. Another prospective study with more samples is recommended for elucidation of familial clustering of constipation, especially the correlation between constipation of mothers and children in our country.

Due to the high frequency of constipation in our study, another study with more samples is recommended. We did not have reliable information about the quality of water in terms of mineral elements that are present with varying degree in water.

Conclusions

The frequency of constipation among mothers was significantly higher in the case group compared to the control group. Another study is recommended in a larger population for evaluation of genetic background, diet, physical activity, and familial clustering among mothers of children with constipation.

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Conflict of interest

The authors declare no conflict of interest.

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