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Recollection of childhood abdominal pain in adults with functional gastrointestinal disorders

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Abstract

Objective—It is hypothesized that adults who can recall abdominal pain as children are at risk of experiencing a functional gastrointestinal disorder (FGID), but this is not specific to any particular FGID. The aim of this study was to evaluate the association between recollecting abdominal pain as a child and experiencing a FGID.

Material and methods—A valid self-reported questionnaire of GI symptoms was mailed to a random population-based sample in Olmsted County, Minnesota. Logistic regression models adjusting for age, gender, body mass index (BMI), somatization, and other factors were used to estimate the odds ratios (ORs) for having a FGID in individuals recalling bouts of stomach or abdominal pain in childhood (before age 15).

Results—Overall, 2298 (55%) of a total of 4194 eligible adult subjects returned a completed questionnaire. Of the respondents, 213 (9%) recalled experiencing abdominal pain as children. Adults who recalled experiencing abdominal pain in childhood had greater odds for reporting symptoms of a FGID (OR 1.9; 95% CI 1.4–2.7). Recalling abdominal pain in childhood was significantly associated with irritable bowel syndrome (IBS) (OR 2.5; 95% CI 1.7–3.6) but not gastroesophageal reflux, dyspepsia, constipation, or diarrhea, adjusting for age, gender, BMI, somatic symptoms, marital status, and education.

Conclusions—Recollection of childhood abdominal pain is specifically associated with IBS in adults. This suggests that a proportion of adults with IBS may have onset of symptoms of abdominal pain during childhood.

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Keywords

Abdominal pain; functional gastrointestinal disorders; irritable bowel syndrome; pediatrics

Introduction

Recurrent functional abdominal pain is one of the most common chronic episodic conditions in childhood, and is experienced by approximately 8% of otherwise healthy children [1]. Children with these symptoms experience continuous or episodic abdominal pain with or without accompanying upper or lower gastrointestinal (GI) symptoms; there is no readily identifiable etiology [2,3]. Because of the similar characteristics between the two conditions, chronic recurrent functional abdominal pain in childhood has been proposed to be an early manifestation of adult irritable bowel syndrome (IBS), characterized by abdominal pain or discomfort with altered bowel symptoms [4]. If symptoms of recurrent functional abdominal pain represent the initial presentation in the natural history of adults with IBS, this may have important implications for pediatric practitioners in their approach to childhood disease and illness management.

One way of ascertaining whether the onset of IBS occurs during childhood would be to ask adults to recollect the onset of their symptoms. Lowman et al. presented a semi-structured interview to adults with IBS who had consulted with a physician, and adults with symptoms of IBS who had not seen a physician (non-patients) [5]. More patients as well as non-patients with IBS reported experiencing stomachaches and bowel complaints during childhood compared with individuals without IBS [5]. However, individuals in this study were recruited to participate in an interview, and it is unclear whether these results could be generalized to a population-based setting. Importantly, no previous study has investigated whether the recollection of abdominal pain during childhood is specific to IBS in adults or a common but non-specific characteristic of all functional GI disorders (FGIDs) and perhaps related to somatization.

The aim of our study was to evaluate the association between recollecting abdominal pain as a child and experiencing a FGID as an adult in a population-based sample. We hypothesized that adults who recalled abdominal pain as a child were at risk of experiencing a FGID, but this is not specific to any particular FGID. We further hypothesized that the association between recollecting abdominal pain as a child and experiencing a FGID could be explained by additional individual factors such as gender and somatization.

Material and methods

Sample

The population of Olmsted County comprises approximately 120,000 persons of whom 89% are white. Socio-demographically, the community is similar to that of the US white population [6]. Residents of Olmsted County receive their medical care almost exclusively from two group practices: the Mayo Medical Center and the Olmsted Medical Center. The Mayo Clinic has maintained a common medical record system with its two affiliated hospitals (Saint Mary's and Rochester Methodist) for over 90 years. Recorded diagnoses and surgical procedures are indexed, including the diagnoses made for outpatients seen during the office or clinic consultations, emergency room visits, or nursing home care, as well as the diagnoses recorded for hospital inpatients, at autopsy examinations or on death certificates [6]. This system was further developed by the Rochester Epidemiology Project, which created similar indices for the records of other providers of medical care to local residents, most notably the Olmsted Medical Group and its affiliated Olmsted Community Hospital (Olmsted Medical Center).

Thus, the details of the medical care provided to the residents of the county are available for study. Annually, over 80% of the entire population is attended by one or both of these two practices and nearly everyone is seen at least once during any 4-year period [6]. Therefore the Rochester Epidemiology Project (REP) medical records linkage system also provides what is essentially an enumeration of the population from which samples can be drawn.

Procedures

In 2003, a study questionnaire and explanatory letter were mailed to a random sample of adult subjects selected from the REP database. Subjects who had died ($n = 40$), moved from Olmsted County ($n = 86$) or denied research authorization (as required by Minnesota law) ($n = 25$) were excluded from this mailing. Reminder letters were mailed at 2, 4, and 7 weeks. Subjects who indicated at any point that they did not wish to complete the survey were not contacted further. Otherwise, non-responders were contacted by telephone at 10 weeks to request their participation and to verify their residence within the county. Subjects who completed the survey were offered \$5 remuneration. A survey was mailed to 4194 subjects. The institutional review boards of both the Mayo Clinic Rochester and the Olmsted Medical Group granted permission to conduct this study.

Questionnaire

A Bowel Disease Questionnaire (BDQ) was mailed to all subjects. The BDQ contains 46 GI symptom-related items; i.e. 25 items measuring past illness, health-care use, and socio-demographic variables; and a valid measure of non-GI somatic complaints, the somatic symptom checklist (SSC) [7]. The item concerning the recollection of childhood symptoms specifically asks, "Did you have many bouts of stomach or belly pain as a child (before age 15)?"

Definition of cases

Subjects were classified as having a FGID based on their responses to the questionnaire. These items have been previously found to be reliable, with a median kappa statistic chance corrected measure of agreement for symptom items of 0.78 (range, 0.52–1.00) [8]. In the outpatient setting, these items have been demonstrated to have adequate content and construct validity [8]. The symptom-based definitions for each of the FGIDs are presented in Table I. The definitions are not mutually exclusive, that is, subjects could meet the criteria for multiple disorders.

Statistical analysis

To assess the associations between the risk factors (age, gender, body mass index (BMI), somatic symptoms, marital status, and educational level, and the recollection of childhood abdominal pain) and the GI disorders (IBS, gastroesophageal reflux disease (GERD), dyspepsia, functional constipation, and functional diarrhea), the presence or absence of any and each GI disorder was evaluated separately as the dependent variable in logistic regression models. The regression coefficients were estimated univariately and also adjusted for potential confounders to identify which risk factors independently predicted the presence of any, and separately each of the individual FGIDs. The odds ratios (OR) and 95% CIs for reporting the specific symptom disorders in those recollecting childhood abdominal pain (by relatives of those with no recollection) were computed from the estimated coefficients (and their standard errors) in the logistic regression models.

Results

A total of 2298 (55%) of the 4194 eligible subjects returned the survey. The mean age of the responders was 62 years and 53% were female. More females responded than males (53% versus 47%), and responders tended to be slightly older than non-responders (62 ± 12 versus 59 ± 14 years). The proportions of subjects reporting each FGID were as follows: 252 (11%), IBS; 412 (18%), GERD; 111 (5%) dyspepsia; 242 (11%) functional constipation; 299 (13%) functional diarrhea.

Overall, 213 (9%) subjects reported that they experienced repeated bouts of stomach or belly pain in childhood (before age 15). Childhood abdominal pain was univariately associated with IBS (Table IIa), GERD (Table IIb), dyspepsia (Table IIc), but not with functional constipation (Table IId), or diarrhea (Table IIe). In the multiple variable models adjusted for age, gender, BMI, somatic symptoms, marital status, and education, subjects who reported recollecting childhood abdominal pain had higher odds of reporting FGIDs (OR, 1.9; 95% CI 1.4–2.7) and specifically, higher odds for reporting IBS (OR, 2.5; 95% CI, 1.7–3.6) (Figure 1). After adjusting for covariates, the odds for reporting GERD, dyspepsia, functional constipation, and functional diarrhea were not significantly elevated in those who reported childhood abdominal pain relative to those who did not (Figure 1).

Discussion

This population-based study identifies a specific association between the recollection of abdominal pain as a child and IBS in adulthood. In the unadjusted analysis, the recollection of childhood abdominal pain was significantly associated with IBS, GERD, dyspepsia, and any GI diagnosis. When adjusting for other known and theorized variables that might influence the recollection of childhood abdominal pain and experiencing a FGID, the association between the recollection of childhood abdominal pain and any FGID was also significant. However, this association was primarily driven by IBS, and was not significant for any other specific FGIDs, namely GERD, dyspepsia, functional constipation, and functional diarrhea.

Studies that have re-surveyed children who initially presented with functional recurrent abdominal pain have found continued symptoms of abdominal pain or IBS at 5 [9,10], 10 [11], and 30 years of age [12] in 18–61% of individuals. However, this information is contradictory to information reporting that functional abdominal pain during childhood is short lived [13]. Croffie et al. [13] examined the clinical outcomes of 365 children with recurrent functional abdominal pain treated in their clinic. After 2 years, 70% of children reported that their abdominal pain resolved or markedly improved. Although these children were not followed until adulthood, this suggests that not all children with recurrent bouts of abdominal pain will continue to have chronic symptoms or develop IBS. In support of this, the present study demonstrates that 75% of adults who recalled childhood abdominal pain did not have symptoms of IBS. In the only prospective longitudinal birth cohort study to examine this relationship, Howell et al. utilized a prospective population birth cohort to examine childhood abdominal complaints in adults with IBS [14]. IBS diagnosed by age 26 years was significantly more common among individuals with a history of chronic abdominal pain between ages 7 and 9 years, by any history (OR=1.85; $p=0.02$), parental report (OR = 1.82; $p=0.03$), and medical service encounters (OR= 3.75; $p=0.03$) [14]. In the current study we endorse that, in the general population, a proportion of individuals with IBS as adults recalled experiencing symptoms of abdominal pain during childhood. A subset (22%) of subjects with IBS recalled abdominal pain during childhood, and this may represent a subtype of IBS that requires a different therapeutic approach. Among individuals who recalled abdominal pain during childhood, only a proportion (20%) reported symptoms of IBS as adults. Childhood factors that are thought to contribute to the continuation of abdominal pain and progression of IBS include adverse

psychosocial conditions [15], affluent childhood socio-economic status [16], infantile or childhood trauma [17,18], and learning to respond to physical symptoms with disability from parental reactions to illness or social learning [19]. However, childhood factors that can be protective towards the progression of chronic abdominal pain or IBS have not been identified. Understanding more about the natural history of functional abdominal pain and IBS may provide a justification for early illness management strategies for FGIDs. Interventions such as education and cognitive therapies such as guided imagery, and cognitive behavioral therapy for both parents and children may improve long-term outcomes in children who experience functional abdominal pain.

A limitation of the study is that the adults surveyed were asked to recollect distant symptoms from childhood, and this information may not be accurate or may be prone to bias. The ideal study methodology to determine which childhood factors are relevant to adult disease would be to utilize longitudinal birth cohorts that follow individuals from childhood to adulthood. However, these studies would only provide information after decades of observation. In contrast, previous studies utilizing the recollection of childhood events in adults with FGIDs have provided important information on the role of childhood abuse [18], parental separation [20], and social learning of illness behavior during childhood [19] in the development of symptoms of IBS in adults. An additional limitation is that the question of childhood symptoms only focused on abdominal pain and not on other common childhood GI symptoms such as constipation and diarrhea. Therefore, we suggest that these results are preliminary, and further studies are needed to confirm that in a distinct subset of adults with IBS, the onset of their symptoms began during childhood.

A second potential explanation for the result of this study is that subjects who recollect abdominal pain in childhood and symptoms of IBS may experience multiple somatic complaints, and this may reflect the reporting of a somatization trait, and not specifically IBS. In order to account for this, the model demonstrating the association between the recollection of childhood abdominal pain and experiencing a FGID was adjusted for other somatic complaints utilizing the somatic symptom checklist [7]. This is a list of common complaints that occur in patients with somatization trait [7]. We found such complaints did not appear to account for increased recollection of childhood abdominal pain in those having IBS. The strengths of this study are that the participants were drawn from a population-based sample, and it was administered as a validated assessment of GI symptoms that have been previously utilized in other epidemiologic assessments of functional GI symptoms [21,22].

This population-based survey study provides evidence that the recollection of abdominal pain during childhood is specifically associated with adults reporting symptoms of IBS. These findings support the hypothesis that a proportion of individuals with IBS experienced the onset of their symptoms during childhood. Further research into health management strategies initiated during childhood should be developed, as recurrent functional abdominal pain during childhood may be the initial symptom of chronic IBS.

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Figure 1. Adjusted ORs and 95% CI for functional GI disorders reported by adults in subjects recalling childhood abdominal pain (relative to those not recalling pain)*

*Models adjusted for age, gender, BMI, somatic symptom checklist, smoking, alcohol, marital status, and education (95% CI not containing 1 is considered significant). ORs=odds ratios; GI=gastrointestinal, IBS=irritable bowel syndrome; GERD =gastroesophageal reflux disease; BMI=body mass index.

Table I
Symptom-based definitions for functional gastrointestinal disorders.

Irritable bowel syndrome 3 frequent (more than 6 times per year) abdominal pain and altered bowel habit (at least 2 or more of the following more than 25% of the time)
Abdominal pain that is relieved by defecation
Abdominal pain associated with a change in stool form
Abdominal pain associated with a change in stool frequency
Dyspepsia 3 2 or more of the following
Frequent (more than 6 times per year) abdominal pain located in the upper abdomen
Nausea once a week or more
Vomiting once a week or more
Early satiety
Loss of appetite
Functional constipation 3 2 or more of the following more than 25% of the time
Fewer than 3 bowel movements per week
Having to strain to have a bowel movement
Hard stools
Incomplete evacuation
Functional diarrhea 3 one or more of the following 25% of the time
More than 3 bowel movements per day
Having watery or loose stool
Urgency
Reporting diarrhea as the usual bowel pattern
Gastroesophageal reflux 3 at least weekly symptoms of
Heartburn (a burning pain or discomfort behind the breast bone in the chest)
Acid regurgitation (a bitter or sour-tasting fluid coming in the throat or mouth)

Table II

Table IIa. Univariate logistic models for irritable bowel syndrome (IBS). Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No IBS	IBS	OR (95% CI)
Demographics			
Median age (range)	62 (33–93)	61 (34–86)	0.92 [†] (0.83–1.02)
Male	992 (92.1%)	85 (7.9%)	1.00 (ref)
Female	1034 (86.1%)	167 (13.9%)	1.89 (1.43–2.48)
Median BMI (range)	27.9 (11.9–77.5)	28.3 (18–82.6)	1.02 (1.01–1.04)
Somatic symptom checklist score median (range)	0.44 (0–4.0)	0.85 (0–3.33)	3.22 (2.58–4.02)
Marital/Educational status			
Married			
No	401 (83.7%)	78 (16.3%)	1.00 (ref)
Yes	1625 (90.3%)	174 (9.7%)	0.55 (0.41–0.74)
Education			
<High School	102 (83.6%)	20 (16.4%)	1.61 (0.96–2.68)
High School or a college	1074 (89.1%)	131 (10.9%)	1.00 (ref)
College or professional training	824 (89.3%)	99 (10.7%)	0.99 (0.75–1.30)
Childhood pain			
No	1852 (90.4%)	196 (9.6%)	1.00 (ref)
Yes	159 (74.6%)	54 (25.4%)	3.21 (2.28–4.52)

Table IIb. Univariate logistic models for gastroesophageal reflux disease (GERD) symptoms. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No GERD	GERD	OR (95% CI)
Demographics			
Median age (range)	62 (33–93)	61 (34–88)	0.96 [†] (0.88–1.05)
Male	892 (82.4%)	191 (17.6%)	1.00 (ref)
Female	988 (81.7%)	221 (18.3%)	1.05 (0.84–1.29)
Median BMI (range)	27.5 (11.9–77.0)	29.4 (18.4–82.6)	1.04 (1.03–1.05)
Somatic symptom checklist score median (range)	0.41 (0–4.0)	0.76 (0–3.41)	2.86 (2.35–3.48)
Marital/Educational status			
Married			
No	386 (80.1%)	96 (19.9%)	1.00 (ref)
Yes	1494 (82.5%)	316 (17.5%)	0.85 (0.66–1.10)
Education			
<High School	92 (73.6%)	33 (26.4%)	1.48 (0.97–2.26)
High School or a college	976 (80.5%)	236 (19.5%)	1.00 (ref)
College or professional training	789 (84.9%)	140 (15.1%)	0.73 (0.58–0.92)
Childhood pain			

Table IIb. Univariate logistic models for gastroesophageal reflux disease (GERD) symptoms. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No GERD	GERD	OR (95% CI)
No	1710 (82.8%)	356 (17.2%)	1.00 (ref)
Yes	159 (74.6%)	54 (25.4%)	1.63 (1.17–2.27)

Table IIc. Univariate logistic models for dyspepsia. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No dyspepsia	Dyspepsia	OR (95% CI)
Demographics			
Median age (range)	62 (33–93)	63 (34–82)	0.99 [†] (0.85–1.15)
Male	1056 (97.2%)	30 (2.8%)	1.00 (ref)
Female	1131 (93.3%)	81 (6.7%)	2.52 (1.64–3.86)
Median BMI (range)	28.0 (11.9–82.6)	28.3 (17.2–61.5)	1.02 (0.99–1.04)
Somatic symptom checklist score median (range)	0.46 (0–4.0)	0.88 (0–3.41)	3.01 (2.27–3.97)
Marital/Educational status			
Married			
No	453 (93.0%)	34 (7.0%)	1.00 (ref)
Yes	1734 (95.7%)	77 (4.3%)	0.59 (0.39–0.90)
Education			
<High School	117 (93.6%)	8 (6.4%)	1.05 (0.50–2.24)
High School or a college	1140 (93.9%)	74 (6.1%)	1.00 (ref)
College or professional training	901 (97.0%)	28 (3.0%)	0.48 (0.31–0.75)
Childhood pain			
No	1975 (95.5%)	92 (4.5%)	1.00 (ref)
Yes	194 (91.1%)	19 (8.9%)	2.10 (1.26–3.52)

Table IIId. Univariate logistic models for functional constipation. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No constipation	Constipation	OR (95% CI)
Demographics			
Median age (range)	62 (33–88)	67 (36–93)	1.28[†] (1.15–1.44)
Male	971 (90.1%)	107 (9.9%)	1.00 (ref)
Female	1064 (88.7%)	135 (11.3%)	1.15 (0.88–31.51)
Median BMI (range)	28.0 (11.9–82.6)	27.4 (15.2–64.6)	0.99 (0.97–1.01)
Somatic symptom checklist score median (range)	0.46 (0–4.0)	0.62 (0–2.83)	1.57 (1.24–1.98)
Marital/Educational status			
Married			

Table II.d. Univariate logistic models for functional constipation. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No constipation	Constipation	OR (95% CI)
No	417 (87.2%)	61 (12.8%)	1.00 (ref)
Yes	1618 (89.9%)	181 (10.1%)	0.77 (0.56–1.04)
Education			
<High School	112 (91.8%)	10 (8.2%)	0.63 (0.32–1.23)
High School or a college	1056 (87.6%)	150 (12.4%)	1.00 (ref)
College or professional training	845 (91.6%)	77 (8.4%)	0.64 (0.48–0.86)
Childhood pain			
No	1829 (89.3%)	219 (10.7%)	1.00 (ref)
Yes	192 (90.1%)	21 (9.9%)	0.91 (0.57–1.46)

Table II.e. Univariate logistic models for functional diarrhea. Data are summarized as N (%) unless otherwise noted. OR±95% CI outside of 1 is considered statistically significant (in bold).

	No diarrhea	Diarrhea	OR (95% CI)
Demographics			
Median age (range)	62 (33–93)	63 (33–88)	1.08 [†] (0.97–1.19)
Male	919 (85.2%)	159 (14.8%)	1.00 (ref)
Female	1059 (88.3%)	140 (11.7%)	0.76 (0.60–0.98)
Median BMI (range)	27.7 (11.9–82.6)	29.1 (17.1–77.5)	1.03 (1.02–1.05)
Somatic symptom checklist score median (range)	0.47 (0–4.0)	0.56 (0–2.82)	1.28 (1.02–1.59)
Marital/Educational status			
Married			
No	422 (88.3%)	56 (11.7%)	1.00 (ref)
Yes	1556 (86.5%)	243 (13.5%)	1.18 (0.86–1.60)
Education			
<High School	108 (88.5%)	14 (11.5%)	0.75 (0.42–1.34)
High School or a college	1028 (85.2%)	178 (14.8%)	1.00 (ref)
College or professional training	820 (88.9%)	102 (11.1%)	0.72 (0.55–0.93)
Childhood pain			
No	1782 (87.0%)	266 (13.0%)	1.00 (ref)
Yes	181 (85.0%)	32 (15.0%)	1.18 (0.80–1.76)

Abbreviation: BMI=body mass index.

[†] per 10 years.