Nausea in Children With Functional Abdominal Pain Predicts Poor Health Outcomes in Young Adulthood

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BACKGROUND & AIMS: **Nausea is common among children with functional abdominal pain (FAP). We evaluated the relation of nausea to short- and long-term morbidity in pediatric patients with FAP.**

METHODS: **We performed a prospective study of 871 children with FAP (age, 8–17 y) seen in a pediatric gastroenterology practice; follow-up data were collected from 396 of the patients at 8.7 ± 3.3 years later. Participants were defined as having significant nausea if they reported nausea "a lot" or "a whole lot" within the past 2 weeks. Validated questionnaires assessed abdominal pain, gastrointestinal and somatic symptoms, and depression. Baseline measures, anxiety, and the Rome III criteria were assessed in the follow-up evaluation.**

RESULTS: **At baseline, 44.8% of the patients reported significant nausea. Those with nausea reported worse abdominal pain, gastrointestinal symptoms, somatic symptoms, and depression than those without nausea ($P < .001$ for all). When the children had reached young adulthood, those with nausea in childhood continued to have more severe gastrointestinal ($P < .001$) and somatic symptoms ($P = .003$) than patients without nausea in childhood, as well as higher levels of anxiety ($P = .02$) and depression ($P = .02$). In the follow-up evaluation, somatic symptoms, depression, and anxiety remained significant after controlling for baseline abdominal pain severity.**

CONCLUSIONS: **Pediatric patients with FAP and nausea have more severe short- and long-term gastrointestinal and somatic symptoms than patients with FAP without nausea, as well as reductions in mental health and daily function. Pediatric patients with FAP and nausea therefore need intensive treatment and follow-up evaluation.**

Keywords: Functional Gastrointestinal Disorder; Pediatric Nausea; Anxiety.

Functional abdominal pain (FAP) is common among children and adolescents, with a prevalence between 0.3% and 19%.[1] FAP is associated with comorbid somatic symptoms and frequent medical visits.[1] FAP in childhood may predict future morbidity; longitudinal studies have shown that children with FAP are at increased risk for functional gastrointestinal disorders (FGIDs), anxiety, and depression in young adulthood.[2,3]

Nausea is a common somatic symptom among pediatric FAP patients—more than a quarter experience nausea daily, and half experience nausea at least twice a week.[4–6] Despite the absence of an identifiable organic etiology, nausea in FAP patients has been associated with higher levels of disability, negative affect, fatigue, and anxiety.[4,6–9] Currently, there are no empirically supported interventions for pediatric functional nausea.[7] No studies have assessed the impact of nausea prospectively in pediatric FAP patients. Thus, it is unknown whether comorbid nausea increases the risk for poor health outcomes.

The goal of our study was to evaluate the long-term physical and mental health outcomes of pediatric FAP patients reporting clinically significant nausea. We hypothesized that pediatric patients with FAP and nausea (FAP + nausea), compared with pediatric patients with FAP and no nausea (FAP only), would report more somatic and internalizing symptoms both at baseline and at a 9-year follow-up evaluation. In addition, we hypothesized that the FAP + nausea group, compared with the FAP-only group, would be more likely to meet the criteria for a FGID in late adolescence and young

Abbreviations used in this paper: CI, confidence interval; CSI, Children's Somatization Inventory; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, 4th edition; FAP, functional abdominal pain; FGID, functional gastrointestinal disorder; GI, gastrointestinal; POTS, postural orthostatic tachycardia syndrome.

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adulthood, indicating an increased risk for persistence of FAP.

Methods

Patients

Baseline evaluation. Data were drawn from a larger prospective study of health outcomes in consecutive new patients (age, 8–17 y) evaluated for FAP (duration, >3 mo) in a pediatric gastroenterology clinic. Patients were enrolled in Institutional Review Board–approved studies conducted by Walker et al between 1993 and 2004.[2,3,10–13] Patients underwent medical evaluation for abdominal pain and were eligible if they had no significant organic etiology for their pain. Patients with minor histologic findings of esophagitis and normal endoscopy were not excluded because histologic findings alone are not sensitive or specific for organic disease.[14] Additional eligibility criteria included the following: living with parent(s) or a parent figure, capable of consent/assent, and no chronic illness or developmental delay. The baseline sample comprised 871 pediatric FAP patients (60% female; 92%% Caucasian; mean age, 11.61 ± 2.4 y). Patients and parents provided informed consent/assent and completed questionnaires in the clinic at the time of initial evaluation.

Follow-up evaluation. Patients who agreed to follow-up evaluation were contacted by mail or telephone. Eligibility criteria for the follow-up study included age 12 years or older at follow-up evaluation, a minimum of 4 years between the initial evaluation and follow-up evaluation, and no current chronic or life-threatening disease. A total of 760 patients were eligible and 396 patients could be contacted and consented. Four patients were excluded because of incomplete data. Thus, the patient sample at follow-up evaluation comprised 392 pediatric FAP patients assessed at an average of 8.7 ± 3.3 years after the initial evaluation (65% female; 91% Caucasian; mean age, 20.8 ± 3.9 y). For the follow-up study, patients answered questions about their health and current symptoms by means of a telephone interview and online survey. A subset of these patients (n = 336) completed a psychodiagnostic interview.

Measures

Gastrointestinal and nongastrointestinal symptoms. The Children's Somatization Inventory (CSI) assesses the severity of 35 somatic symptoms experienced during the past 2 weeks.[15,16] Two subscales were calculated: gastrointestinal (GI) symptoms and non-GI symptoms. For this study, nausea was excluded from the GI symptom subscale. Patients rated how much they were bothered by each symptom during the past 2 weeks on a 5-point scale ranging from 0 (not at all) to 4 (a lot). For each subscale, item responses were summed, yielding scores ranging from 0 to 32 (GI symptoms) and 0 to 104 (non-GI symptoms). Patients completed the CSI at both baseline and follow-up evaluations.

Nausea. Patients were defined as having clinically significant nausea if they responded "a lot" or "a whole lot" to item 13 on the CSI ("nausea or upset stomach").[15] Patients who reported experiencing nausea "not at all," "a little," or "some" were not considered to have clinically significant nausea.

Abdominal pain. The Abdominal Pain Index assesses the weekly frequency, daily frequency, duration, and typical intensity of abdominal pain during the past 2 weeks.[17] Patient responses are converted to a 5-point scale and averaged to yield a mean index score ranging from 0 to 4. Higher scores indicate more severe abdominal pain. Patients completed the Abdominal Pain Index at both baseline and follow-up evaluations.

Internalizing symptoms. *Depressive symptoms.* At baseline, patients completed the Children's Depression Inventory,[18] a validated self-report measure of depressive symptoms during the past 2 weeks. Responses are summed, yielding a total score between 0 and 54, with higher scores indicating higher levels of depressive symptoms.

At follow-up evaluation, patients completed the Center for Epidemiological Studies—Depression Scale,[19] a validated adult self-report measure of the frequency of 20 depressive symptoms during the past week. Items are summed, yielding a composite score ranging between 0 and 60. Higher scores indicate greater depressive symptoms.

Anxiety symptoms. At follow-up evaluation, the Spielberger State-Trait Anxiety Inventory–Trait Scale[20] assessed the frequency of anxiety symptoms. Items were summed, yielding a composite score between 20 and 80. Higher scores indicate more anxiety. Anxiety symptoms were not assessed at baseline.

Diagnostic and Statistical Manual of Mental Disorders, 4th edition: anxiety and depressive psychiatric disorders. Diagnostic criteria for anxiety and depressive disorders were assessed at follow-up evaluation with The Anxiety Disorders Interview Schedule–IV: Adult Lifetime and Child and Parent Versions,[21] a semistructured interview administered by a trained clinician and designed to assign both current and lifetime Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) psychiatric diagnoses. A clinical severity rating indicating at least moderate severity/impairment is required for assigning a diagnosis of an anxiety or depressive disorder. Further details on the administration of the diagnostic interviews are provided by Shelby et al.[2]

Functional gastrointestinal disorders. The Rome III Diagnostic Questionnaire[22] is a self-report measure used to identify individuals who meet the Rome III symptom criteria for FGIDs. At follow-up evaluation, the 24 items assessing symptoms associated with abdominal pain-related FGIDs (irritable bowel syndrome, functional dyspepsia, abdominal migraine, and functional abdominal pain) were administered.

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