

Chronic abdominal pain in children

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Chronic abdominal pain is a common disorder in children and adolescents worldwide. It affects the child's wellbeing, and the costs from missed school days and use of healthcare resources are high.

Children with chronic abdominal pain represent a heterogeneous population comprising both organic and functional gastrointestinal disorders. Functional disorders are those that cannot be explained by structural or biochemical abnormalities. Differences in prevalence of organic disease are reported depending on the setting, ranging from 5% in the general population to 40% in a paediatric gastroenterologist practice.¹ General practitioners feel confident in labelling chronic abdominal pain as an easy to manage functional disorder. After minimal further testing, these children and their parents can be reassured by explaining that the symptoms are common and rarely associated with disease. However, when diagnostic uncertainty increases, pain does not resolve over time, or parents are hard to reassure, extensive testing and referral easily set in. As a consequence paediatricians perceive chronic abdominal pain as a time consuming and therapy resistant disorder.

What are we talking about?

In the late 1950s Apley and Naish introduced the term recurrent abdominal pain in children for pain that waxes and wanes, occurs for at least three episodes within three months, and is severe enough to affect the child's activities (box 1).² This definition has been criticised for including both organic and non-organic causes. Von Bayer and Walker proposed a two stage approach to classification.³ For the first stage a child's presentation needs to be consistent with Apley's criteria, whereas for the second stage subgroups are identified on the basis of medical findings—for example, recurrent abdominal pain with constipation, constipation and anxiety, or no identifiable cause.

Both approaches are based on the concept that functional abdominal pain is a diagnosis by exclusion. The suggestion arose to facilitate the diagnosis of functional disorders on the basis of symptoms alone. According to a model used in adults, a panel of experts in childhood gastrointestinal disorders subdivided childhood chronic abdominal pain into several well defined categories on the basis of symptoms, the Rome criteria (box 1). These criteria distinguish five

functional gastrointestinal disorders related to abdominal pain.⁴

At present the Rome criteria are not useful in daily clinical practice. Further research is needed on their prognostic and diagnostic value (for example, whether they discriminate between relevant patient groups) and on their responsiveness to different interventions.⁵⁻⁷

Who get's chronic abdominal pain?

The prevalence of chronic abdominal pain in community based studies ranges from 0.5% to 19%,^{8,9} and varies according to age and definitions used (table 1).^{w1-w4} Studies that included large age ranges show two age peaks; the first at 4-6 years of age and the second at 7-12 years of age.^{w2} The predominance of girls is controversial (table 1).^{w1 w5-w7 8 9}

Do sexually abused children get chronic abdominal pain?

Population based and clinical studies have consistently suggested that a considerable number of adults with irritable bowel syndrome report histories of physical, emotional, and sexual abuse.¹⁰ Little is known about the role of sexual abuse and the association with chronic abdominal pain in children. In one case-control study 72 abused children reported more functional disorders than did controls (48 v 26).¹¹ In a prospective study, abused and non-abused boys reported comparable rates of functional disorders; the duration of the problems, however, was significantly longer in abused boys than non-abused boys (table 1).¹²

Sources and selection criteria

We used the Cochrane library to identify relevant systematic reviews that evaluated the effectiveness of pharmaceutical, psychological, and complementary interventions for chronic abdominal pain in children. Medline searches were used to find relevant systematic reviews on diagnosis and treatment of abdominal pain in children using the keywords "abdominal pain", "systematic review", "meta-analysis", "diagnosis", and "treatment". We limited our searches to "all child". Statements on prognosis of chronic abdominal pain were derived from a systematic literature search in Medline, Embase, and PsycINFO of prospective cohort studies on the topic. We took additional references from our personal files.

Do children of anxious or depressed parents get chronic abdominal pain?

Both maternal and paternal anxiety in the first year of a child's life are associated with chronic abdominal pain before the age of six years (odds ratio 1.53, 95% confidence interval 1.24 to 1.89 and 1.38, 1.12 to 1.71,

respectively).¹³ This suggests that anxious parents, worried by their child's symptoms, may respond to their child in a way that strengthens the recurrence of symptoms.¹⁴ That family factors play a role was emphasised by the finding that children of a parent with gastrointestinal problems are more likely to have chronic abdominal pain than children of a parent without such problems (odds ratio 5.3, 95% confidence interval 2.1 to 13.2; table 1).^{w18}

Why do children get chronic abdominal pain?

The cause and pathogenesis of chronic abdominal pain in children is undoubtedly multifactorial and not well understood. Visceral sensation, hormonal changes, inflammation, disturbances in gastrointestinal motility, psychological factors, and family dynamics have been suggested as contributory factors to chronic abdominal pain of functional origin. It is known that the brain and gut have a constant exchange of information. An example of the complex origin of functional abdominal pain is the observation that patients who develop an intercurrent bacterial colitis are more likely to develop irritable bowel syndrome if the infection occurs during stressful life events.¹⁵

Biopsychosocial model of illness

A biopsychosocial model provides a conceptual basis for understanding and legitimising gastrointestinal symptoms not easily allocated to specific organic diseases, such as abdominal pain, diarrhoea, and constipation. In a biopsychosocial model of care, the management of a child with functional abdominal pain takes all related factors into account. Behavioural changes to cope better with the pain may therefore be as appropriate as pharmacological interventions to modulate visceral sensitivity and motility.

How is it diagnosed?

Recently a committee of American paediatric gastroenterologists concluded that there are no diagnostic tools to distinguish functional abdominal pain from organic abdominal pain. Only the presence of alarm symptoms or signs increases the probability of an organic disorder and justifies further diagnostic testing.¹⁶ Alarm symptoms or signs include, but are not limited to, those summarised in box 2. Children with alarm symptoms need additional laboratory testing (erythrocyte sedimentation rate, comprehensive metabolic panel, and stool analysis) to examine the possibility of organic abnormalities such as inflammatory bowel disease, coeliac disease, or less prevalent abnormalities.

What is the diagnostic value of history and physical examination?

When alarm symptoms are not found, there is no evidence that pain characteristics such as frequency, severity, or location are able to discriminate between functional and organic disorders. Accompanying symptoms such as headache, anorexia, nausea, constipation, or arthralgia occur as much in children

Box 1 | Classification systems for abdominal pain in children

Apley and Naish, 1958

Recurrent abdominal pain

Abdominal pain that waxes and wanes, occurs for at least three episodes within three months, and is severe enough to affect a child's activities

Subcommittee on chronic abdominal pain, 2005

Chronic abdominal pain

Longstanding intermittent or constant abdominal pain
Functional in most children—that is, without objective evidence of an underlying organic disorder

Rome III criteria, 2006

Functional dyspepsia

Must include all of the following*†:

- Persistent or recurrent pain or discomfort centred in the upper abdomen (above the umbilicus)
- Not relieved by defecation or associated with the onset of a change in stool frequency or stool form

Irritable bowel syndrome

Must include all of the following*†:

- Abdominal discomfort (uncomfortable sensation not described as pain) or pain associated with two or more of the following at least 25% of the time:
 - Improved with defecation
 - Onset associated with a change in frequency of stool
 - Onset associated with a change in form (appearance) of stool

Functional abdominal pain

Must include all of the following*†:

- Episodic or continuous abdominal pain
- Insufficient criteria for other functional gastrointestinal disorders

Functional abdominal pain syndrome

Must include functional abdominal pain at least 25% of the time and one or more of the following*†:

- Some loss of daily functioning
- Additional somatic symptoms such as headache, limb pain, or difficulty in sleeping

Abdominal migraine

Must include all of the following*‡:

- Paroxysmal episodes of intense, acute periumbilical pain that lasts for one or more hours
- Intervening periods of usual health lasting weeks to months
- The pain interferes with normal activities
- The pain is associated with two or more of the following:
 - Anorexia
 - Nausea
 - Vomiting
 - Headache
 - Photophobia
 - Pallor

*No evidence of an inflammatory, anatomical, metabolic, or neoplastic process that explains symptoms †Criteria fulfilled at least once a week for at least two months before diagnosis ‡Criteria fulfilled two or more times in the preceding 12 months

Box 2 | Alarm symptoms when a child presents with chronic abdominal pain

- Involuntary weight loss
- Deceleration of linear growth
- Gastrointestinal blood loss
- Significant vomiting
- Chronic severe diarrhoea
- Unexplained fever
- Persistent right upper or right lower quadrant pain
- Family history of inflammatory bowel disease

with abdominal pain as a manifestation of a functional disorder as in children with abdominal pain due to an organic disorder.¹⁶ The presence of recent stressful life events, anxiety, depression, or behavioural problems is not useful in distinguishing between functional and organic abdominal pain.¹⁶ Studies evaluating this relation could not establish whether children became anxious or depressed because of their abdominal pain or whether anxiety or depression triggered the pain (table 1).

No studies could show that stressful life events significantly differentiate patients with functional abdominal pain from other patient groups (table 1).¹⁶

Good data evaluating the diagnostic value of physical examination are lacking.

What is the diagnostic value of additional testing?

No studies have evaluated the usefulness of common laboratory tests (complete blood cell count, erythrocyte sedimentation rate, comprehensive metabolic panel, urinalysis, stool parasite analysis) to distinguish between organic and functional abdominal pain in the absence of alarm symptoms. Evidence that radiographic or ultrasonographic examination of the abdomen, oesophageal pH monitoring, or endoscopy and biopsy can discriminate between functional or organic abdominal pain is lacking or insufficient.¹⁶ Whenever abnormalities are found

their relation with abdominal pain is questionable. Children with *Helicobacter pylori* were not more likely to have abdominal pain than children without *H pylori*¹⁷ and the same was found for children with a lactose malabsorption. Positivity for antiendomysial antibodies, an indication of coeliac disease, was equally present in children with chronic abdominal pain as controls.¹⁸

What do we know about prognosis?

Most children with functional abdominal pain have relatively mild symptoms and are managed in primary care. For example, in Dutch general practice fewer than 2% of children with functional abdominal pain are referred to secondary care.¹⁹

Studies that examine the prognosis of chronic abdominal pain are mainly in children referred to a paediatrician or paediatric gastroenterologist.

A recent systematic review of prospective follow-up studies in children with chronic abdominal pain showed that the mean percentage of children with continuing abdominal pain was 29.1% (95% confidence interval 28.1% to 30.2%) (personal communication). Compared with children who had no chronic abdominal pain at baseline these percentages were considerably higher (odds ratio 6.28, 95% confidence interval 4.81 to 8.21). The reported duration of follow-up in the studies ranged from 1 to 29 years (personal communication).

Some studies suggest that children with chronic abdominal pain, and in particular girls, develop irritable bowel syndrome as adults.²⁰ In addition, there is evidence that children with chronic abdominal pain are at risk of later emotional symptoms and psychiatric disorders, particularly anxiety disorders.¹⁶

What factors predict long term persistence of pain?

From the prospective follow-up studies available it seems that parental factors, rather than psychological characteristics of the child, predict the persistence of abdominal pain (personal communication) (table 1).

Acceptance by parents of the role of psychological factors in the maintenance of symptoms is strongly

Table 1 | Factors related to diagnosis, incidence, and prognosis of functional abdominal pain

Factors	Likely to be related	Inconclusive	Unlikely to be related
Diagnosis:			
Factors or findings that differentiate between functional and organic abdominal pain	Alarm symptoms increase the risk of organic disease	<i>Helicobacter pylori</i> and antiendomysial antibody positivity ¹⁷ are equally present in children with chronic abdominal pain and children without abdominal pain	Pain characteristics such as frequency, severity, or location; other functional symptoms; anxiety, depression; lactose malabsorption
Incidence:			
Factors related to occurrence of functional abdominal pain	Age of child; parental anxiety in first year of child's life; parents with gastrointestinal problems; low socioeconomic status	Female sex; anxiety, depression; stressful life event; sexual abuse	Family functioning; marital status of parents
Prognosis:			
Factors related to persistence of functional abdominal pain	No acceptance by parents that the disorder is functional; parental attention to child's discomfort; parental functional problems; stressful life event, sexual abuse	Age; female sex; self confidence; other functional symptoms; coping style of parents; low socioeconomic status	Anxiety, depression; severity of pain

associated with recovery.²¹ Recently Walker et al showed that parents' attention to children's discomfort was associated with significantly more mention about symptoms than when parents' behaviour was intended to distract.¹⁴

Children with chronic abdominal pain who experience stressful life events are at risk of persistent abdominal pain. The presence of a depressive or anxiety disorder in children with chronic abdominal pain does not, however, influence whether children continue to have abdominal pain (personal communication).¹⁶

Can chronic abdominal pain be treated?

Reassurance is the primary therapy in children with chronic abdominal pain without alarm symptoms; a substantial proportion of clinicians, however, prescribe dietary or pharmacological interventions, including analgesics, antispasmodics, sedatives and, recently, probiotics. Evidence for an effect of these interventions is based on only 12 randomised controlled trials.²²⁻²⁶ Most studies were small and were carried out in children referred to paediatricians or paediatric gastroenterologists. Children with psychiatric problems (such as anxiety or depressive disorders) and children with known organic disorders and constipation were excluded from all studies (table 2).

How effective are pharmacological and dietary interventions?

Peppermint oil is thought to relax smooth muscle. In one randomised controlled trial 42 children with

Box 3 | Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition

- The term recurrent abdominal pain should be retired
- Diagnosis**
- Diagnostic triage to discriminate functional abdominal pain from organic disorders in young people aged 4 to 18 years with chronic abdominal pain can be carried out by a general practitioner
 - Diagnostic triage should be carried out by means of assessment of alarm symptoms or signs and physical examination
 - Additional diagnostic evaluation is not required in children without alarm symptoms
 - Testing may be carried out to reassure children and their parents
- Treatment**
- Deal with psychological factors
 - Educate the family (an important part of treatment)
 - Focus on return to normal functioning rather than on the complete disappearance of pain
 - Best prescribe drugs judiciously as part of a multifaceted, individualised approach, to relieve symptoms and disability

irritable bowel syndrome were given peppermint oil capsules or placebo. Improvements on a scale showing change in symptoms were reported in 71% of the children receiving peppermint oil compared with

Table 2 | Effectiveness of treatments for abdominal pain in children

Therapy	Definition of disorder	Description of trials	Side effects	Effectiveness
Cognitive behavioural (family) therapy	Recurrent abdominal pain	Three randomised trials in 60 referred and 69 non-referred children compared cognitive behavioural therapy with waiting list or standard medical care	None reported	Beneficial
Famotidine	Recurrent abdominal pain and dyspeptic symptoms	One randomised placebo controlled trial in 25 referred children; children showed improvement on a subjective scale but not on an objective measurement of abdominal pain	Not evaluated	Inconclusive
Added dietary fibre	Recurrent abdominal pain	Two randomised placebo controlled trials in 52 non-referred children and 40 children admitted to hospital	Not evaluated	Unlikely to be beneficial
Lactose-free diet	Recurrent abdominal pain	Two randomised controlled trials comparing a lactose containing diet with a lactose-free diet in 38 children	Not evaluated	Unlikely to be beneficial
Peppermint oil	Irritable bowel syndrome using Manning criteria	One randomised placebo controlled trial of peppermint oil for two weeks in 42 children referred to a paediatric gastroenterology centre	Not evaluated	Likely to be beneficial
Pizotifen	Abdominal migraine using Rome II criteria	One placebo controlled crossover trial of pizotifen for one month in 14 referred children	Drowsiness, weight gain	Likely to be beneficial
Lactobacillus GG	Irritable bowel syndrome using Rome II criteria	One randomised placebo controlled trial of lactobacillus GG in 50 children referred to a paediatric gastroenterology centre	Not evaluated	Unlikely to be beneficial

The effectiveness of analgesics, antispasmodics, sedatives, and antidepressants is currently unknown.

ONGOING RESEARCH

What factors predict whether abdominal pain becomes chronic in children?

What interventions are effective in reducing chronicity of abdominal pain in children?

What interventions are effective in giving symptom relief and reducing its correlated functional disability?

Do the Rome criteria predict the course of functional abdominal pain and the response to specific treatment in children?

43% receiving placebo (relative risk 1.67, 95% confidence interval 0.95 to 2.93).²⁴ A committee of American paediatric gastroenterologists concluded that peppermint oil given for two weeks might improve symptoms in children with irritable bowel syndrome.¹⁶

In a placebo controlled crossover trial in 14 children with abdominal migraine, the children reported fewer days of pain while taking pizotifen (mean 8.21 pain free days, 95% confidence interval 2.93 to 13.48).²²

Available evidence is inconclusive for an effect of the H2 receptor agonist famotidine on symptoms in children with functional abdominal pain. Famotidine improved dyspeptic symptoms only in a subgroup of children with severe dyspeptic symptoms.^{22,24}

The addition of dietary fibre is not effective (relative risk 1.16, 95% confidence interval 0.47 to 2.87).²³ Lactose avoidance is unlikely to improve symptoms of functional abdominal pain.^{22,24}

In one randomised controlled trial in children with irritable bowel syndrome, abdominal pain was not reduced with use of lactobacillus GG compared with placebo.²⁵

How effective are psychological interventions?

The biopsychosocial model suggests that functional abdominal pain is related to several causes and in part to learnt response patterns. Cognitive behavioural therapy is intended to intervene with learnt response patterns. Three randomised controlled trials evaluated the efficacy of a cognitive behaviour programme and a cognitive behaviour intervention for the family in the treatment of recurrent abdominal pain.^{22,26} In one study improvement occurred more quickly in the intervention group than in the control group, and a larger proportion of children became completely pain-free. In the second study a higher rate of complete elimination of pain and lower levels of relapse were found at six and 12 months in the intervention group. In the third study the intervention group reported significantly fewer episodes of abdominal pain immediately after the intervention and after one year's follow-up; significantly fewer school absences occurred in the intervention group.²⁶

What do guidelines recommend?

Recently a subcommittee on chronic abdominal pain of the North American Society for Pediatric

Gastroenterology, Hepatology, and Nutrition presented recommendations for clinicians in primary and secondary care (box 3).¹⁶

How can we improve the management of chronic abdominal pain?

Given the multifactorial onset of chronic abdominal pain and the impact of family factors, the disorder is exceptionally suitable to be managed in general practice. Most knowledge about the prognosis and management of chronic abdominal pain, however, comes from studies carried out in referred children. This paradox should trigger research in primary care.

A patient's perspective

I am Daphne. I am 12 years old. I have stomach-ache almost every day; the pain can just come on like that, but when I am nervous—for instance, about a test paper—it appears more often. Sometimes my belly contracts with force and I have to run for the toilet, or I have to throw up, or I don't feel good at all.

In the beginning I often had to miss school, now I am used to it. I sit down and wait patiently; there isn't much I can do about it. I prefer to go outdoors into the fresh air. I try not to get stressed, because that would upset my stomach even more.

I am a little ashamed of it. Some people find it awkward, but I am not badgered about it. Also when I don't feel well I will do my football training. During a training camp, I usually have diarrhoea and have to throw up, but I go anyway.

I don't know where it comes from; there is no specific reason.

It is not that big a deal to me; I have had this for the last four years, and I feel that it's useless to get angry or sad about it because what difference would it make?

A parent's perspective

I am Daphne's mother. Daphne has had stomach-ache since the age of seven years. The family doctor prescribed laxatives but they were not effective in relieving the pain. Subsequently Daphne was referred to a paediatrician. Blood, faeces, and urine tests revealed no abnormalities. Even endosonography and endoscopy were performed which also showed no cause for the pain. Each time we came to the outpatient clinic Daphne had to tell her story over and over again. At a certain moment I thought, "What am I still doing here, they can not do anything anyway." So we stopped seeing the paediatrician. But I often still ask myself if there should be more behind it. I then hesitate about a second opinion.

I feel so powerless when Daphne has pain or when she is on the toilet that long. In the beginning I was very considerate and kept her from school, but at the same time I did not want to spoil her too much, because I feared that then the pain would predominate. Happily enough she now manages quite well. As a family we reckon with it but we give up nothing. We always have a toilet roll in the car and if necessary we stop on the hard shoulder.

Daphne is a victim of heredity because both my husband and I have the same trouble.

SUMMARY POINTS

Chronic abdominal pain in children is not usually caused by organic disease

Diagnostic triage focuses on the assessment of alarm symptoms by means of history and physical examination

Additional diagnostic evaluation is not required in children without alarm symptoms

Family characteristics rather than patient characteristics influence the chronicity of abdominal pain

A specific intervention cannot be recommended owing to lack of evidence of a beneficial effect

The challenge is to identify children at risk of a prolonged course of pain and its correlated functional disability

In daily clinical practice a careful medical history and thorough physical examination should be sufficient to recognise children with functional abdominal pain. It should not be forgotten, however, that functional abdominal pain has a great impact on a child's wellbeing and that in a considerable number of children it might persist. If time can be reserved to evaluate family coping strategies and psychosocial factors and if appropriate follow-up can be arranged, ineffective use of healthcare resources might be prevented.

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ADDITIONAL EDUCATIONAL RESOURCES

Cochrane Library (www.cochrane.org)

Systematic reviews and meta-analyses on the efficacy of treatments for chronic abdominal pain

Useful references

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Information for patients

International Foundation for Functional Gastrointestinal Disorders (www.aboutkidsgi.org/)

The foundation is a non-profit organisation that tackles the problems associated with living with gastrointestinal functional disorders.

Membership required

American College of Gastroenterology (<http://gi.org/patients/gihealth/functionalab.asp>)

Patient information on functional abdominal pain in children

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