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The impact of recurrent abdominal pain: predictors of outcome in a large population cohort

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Abstract

Aim—Recurrent Abdominal Pain is one of the commonest complaints of childhood, affecting approximately 10% of children at any one time. This study aims to describe the outcome of recurrent abdominal pain amongst 6-year old children, and to identify risk factors (in both the children and their parents) which predict these outcomes.

Methods—7128 six-year old children in the Avon Longitudinal Study of Parents and Children (ALSPAC) were followed up for one year. The principle outcomes were abdominal pain, number of days missed from school in the preceding year, and psychiatric diagnoses.

Results—Children with recurrent abdominal pain at age 6 years had higher rates of further abdominal pain (Odds Ratio 4.88 (95% CI: 4.01, 5.95)), school absence (10 or more days off school in a year) (OR 1.89 (1.53, 2.33)) and anxiety disorders (OR 2.36 (1.68, 3.32)) at age 7 years. Maternal anxiety was the most consistent predictor of subsequent adverse outcomes for these children.

Conclusion—Children with recurrent abdominal pain are at significant and continuing risk of adverse functioning. It is important for clinicians to take a whole family perspective, and particularly to consider parental anxiety, when a child with recurrent abdominal pain presents to them.

Keywords

Avon Longitudinal Study of Parents and Children (ALSPAC); parental anxiety; recurrent abdominal pain

Recurrent Abdominal Pain is one of the commonest complaints of childhood affecting approximately 10% of children at any one time (1;2). Although it has at times been considered a self-limiting condition of minor importance, recurrent abdominal pain is a frequent cause of hospital admission (3), with significant cost implications (4), as well as causing distress to children and their parents. Children with recurrent abdominal pain are, in

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Drs Fazel and Ramchandani had primary responsibility for undertaking the data analysis and writing the manuscript. All five authors contributed to the protocol development, design of the study and writing of the manuscript. The ALSPAC study team undertook the original patient recruitment and data collection (please see acknowledgments above).

addition, more likely to experience disruptions in their education with increased school absence (5). Children suffering from the broader spectrum of 'functional symptoms' (e.g. headaches, limb pains) share this increased use of health services and greater school absence (6). Recurrent abdominal pain is commonly defined as three or more episodes of pain occurring over a period of at least three months, with the pain sufficient to cause some impairment of function (1). There have been few population follow up studies of children with the problem. Follow-up studies of clinical populations have generally been small scale, but have demonstrated high rates of continued abdominal pain (1;7), anxiety symptoms (8) and school absence (9). In the only large, population based follow-up study (10), children with chronic abdominal pain had a greater likelihood of developing psychiatric disorders in adulthood.

There remains a need for follow up studies of children presenting with recurrent abdominal pain in community settings to understand the prognosis of the condition. Using data from a large population based cohort, this study aims to describe the outcome of recurrent abdominal pain amongst 6-year old children in terms of symptom persistence, school absence and psychiatric disorder one year later. It also aims to identify risk indicators (in both the children and their parents) which influence these outcomes in these children.

PARTICIPANTS AND METHODS

Participants

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a longitudinal study of child development that has followed-up children who were born between April 1991 and December 1992. The background and detailed methods of the study have been previously described (11). 13,971 children were initially included in the study.

Measurement of Abdominal Pain

Recurrent abdominal pain was assessed by questionnaire, completed by mothers, when the children were age 6. Two questions were asked about the occurrence and frequency of abdominal pain. The recurrent abdominal pain group was defined as those children who had abdominal pain 5 or more times in the past year. This gives a group that is broadly comparable with the widely used Apley and Naish definition (1;12).

Measurement of outcomes

At follow up, age 7, parents completed a further questionnaire which gave detail on school attendance and also whether the child had experienced abdominal pain. We were not able to identify a group with recurrent abdominal pain at age 7 years as no data was available about the frequency of abdominal pain, only whether it had occurred or not in the previous year. The Development and Well-Being Assessment (DAWBA) was also completed. This is a structured questionnaire which combines parental (usually mother) and teacher questionnaires to generate DSM-IV psychiatric diagnoses (13). The DAWBA has been well-validated (13).

Predictors of outcome

Child-based factors included gender, number of siblings, past history of recurrent abdominal pain, other pain symptoms, and psychological symptoms. Maternal factors included measures of anxiety and education. Data on paternal anxiety were available for a subset of fathers.

Children's psychological symptoms were assessed with the Strengths and Difficulties Questionnaire (SDQ), a widely used and well-validated screening questionnaire (14). It was

completed by the mother. The SDQ consists of 25 questions which divide into five subscales, (emotional symptoms, hyperactivity, conduct problems, peer problems, and a prosocial score). The first 4 subscale scores can be combined to give a total difficulties score. For a more clinically meaningful comparison, we analysed the two groups looking at the highest 10% scorers on each scale, as recommended. Parents also answered questions about the presence of other pain symptoms (headaches and limb pains) in their child in the preceding 12 months. Abdominal pain was asked about at age 3, so identifying a group with recurrent abdominal pain at that age.

Maternal and paternal anxiety were measured using the anxiety subscales from the Crown-Crisp index, a validated self-report questionnaire (15). As in previous research, the top 15% scoring mothers and fathers were taken as high scorers. Internal consistencies exceed 0.80 in this sample (16). Data was not available for maternal anxiety when the child was age 6, and so we used information on maternal anxiety from the latest available time point (child age 33 months). Maternal anxiety symptoms have been found to be relatively stable over time in this sample (correlation from 21 to 33 months = 0.71). Level of maternal education was also recorded.

All participants provided informed consent, and the study was approved by the ALSPAC Ethics and Law committee and local research ethics committees.

Data analysis

We excluded twins/multiple births from our dataset in order to remove any possible familial clustering effects. In total, 8089 children had data on recurrent abdominal pain at 6 years and, of these, 7128 had data on abdominal pain, school absences and psychiatric diagnoses one year later. All analyses were conducted using SPSS for Windows, version 11.5. We first examined the association between recurrent abdominal pain at age 6 and three later outcomes: abdominal pain, school absence and psychiatric diagnosis. Chi square tests were used and odds ratios (OR) and 95% confidence intervals (95%CI) calculated. Logistic regression was then used to control for the potential confounding effects of parental educational level and child gender. We then used logistic regression to identify factors that predicted a poor outcome amongst those children who had recurrent abdominal pain at age 6. Separate models were constructed for each of the three main outcomes. Both child and parental risk factors (listed previously) were considered. Potential predictors were initially considered in univariable models, with independent effects subsequently evaluated in multivariable models that controlled for maternal education and gender of the child. Paternal factors were only available for a subset of fathers and the analyses repeated for this subgroup. We also explored the additive effects of maternal and paternal anxiety as this has previously been identified as predicting recurrent abdominal pain (17).

RESULTS

961/8089 (11.9%) children had recurrent abdominal pain at age 6. The epidemiology of this group has been previously described (18). Those who dropped out of the study between ages 6 and 7 years were less likely to have recurrent abdominal pain than those who remained (9.5% vs 12.2%; OR 1.32 (1.06, 1.65)).

Outcomes one year after Recurrent Abdominal Pain

Those with recurrent abdominal pain at age 6 had an increased risk of further abdominal pain, school absence (10 or more days off school in a year) and anxiety disorders, but not of other psychiatric disorders, at age 7 (see Table 1). Within the group of anxiety disorders the

strongest associations were with generalized anxiety disorder (OR 2.71 (95% CI:1.26, 5.85)) and separation anxiety disorder (OR 2.29 (1.19, 4.39)).

Controlling for the potential confounding effects of maternal educational level and child gender did not have a significant effect on these results, although there was evidence of negative confounding for ADHD (see Table 1).

Predicting adverse outcomes for children with recurrent abdominal pain

The factors which most strongly predicted further abdominal pain in the child were having headaches (OR 2.13 (1.39, 3.25)), and a history of maternal anxiety (2.57 (1.13, 5.86)). The factors that most strongly predicted school absence were limb pains (1.71 (1.10, 2.65) and maternal anxiety (1.77 (1.04, 3.03)). Finally the factors that most strongly predicted a diagnosis of anxiety disorder one year later were a high level of emotional symptoms in the child at age 6 (4.39 (2.07, 9.26) and maternal anxiety (2.72 (1.25, 5.92) (see Table 2). In all the analyses maternal educational level, number of children in family and child gender were controlled for.

Anxiety in fathers was not independently associated with any of the adverse outcomes following recurrent abdominal pain. However, there was an additive effect of parental anxiety in the case of school absence, as those children for whom both parents had high anxiety did have an increase in their odds of missing school. 50/339 (12.9%) children missed 10 or more days of school if neither parent had anxiety, 19/81 (19.0%) if one parent had anxiety, 5/13 (38.5%) if both parents had anxiety (Chi^2 (2 d.f.) = 8.37; $p=0.015$). There was no similar effect for continuing abdominal pain or child anxiety diagnoses.

DISCUSSION

This study demonstrates the increased likelihood of adverse outcomes experienced by children with recurrent abdominal pain. Children reported as having recurrent abdominal pain at age 6 were found to have a higher prevalence of abdominal pain at age 7 and also of anxiety disorders (in particular generalised anxiety disorder and separation anxiety disorder). In addition, they had a two-fold increase in the odds of being absent from school for 10 days or more in the early years of their education.

Maternal anxiety was strongly associated with an increased odds of a poor outcome amongst 6 year old children with recurrent abdominal pain. Interestingly maternal anxiety not only predicted later abdominal pain in these children, but was also associated with anxiety disorders and school absence recorded at age 7. The presence of headaches and limb pains in the child were also associated with continued abdominal pain and school absence. A high score on the emotional symptoms scale of the SDQ predicted ongoing anxiety problems in the recurrent abdominal pain group.

Limitations

There are three main limitations. First, the diagnostic criteria for recurrent abdominal pain have been subject to some debate (19). The ROME criteria have provided more clearly defined operational criteria; but these have been little used in research, and have been further revised (20). The definition of recurrent abdominal pain used in the present study is somewhat different from the widely used "Apley criteria" (1;12), in that the frequency of abdominal pain was 5 or more times in a year compared to the 3 or more times used by Apley. We were also unable to include a detailed assessment of symptom impact. However the rate of recurrent abdominal pain found in the present study is very close to the found by Apley and other studies using his criteria (1;2). In addition, approximately one fifth of the children with recurrent abdominal pain in this study had visited a physician for their pain

(18), indicating a significant level of impairment in this group. It is possible that some of the children in the recurrent abdominal pain group did have an underlying organic cause for their pain, although this is uncommon (21;22). Second, the documentation of childhood symptoms was based on maternal report. Whilst this is typical for reports of symptoms in young children, it is possible that raised levels of maternal anxiety may be related to increased reporting of children's abdominal pain. Thus the strong association found between maternal anxiety and increased risk of later outcomes in the children with recurrent abdominal pain may be due in part to information bias. Third, we had no concurrent measure of parental anxiety, and so had to use an anxiety measure taken when the children were younger. Although there was significant continuity of parental anxiety symptoms across time, it does mean that random misclassification may have led to us under-estimating the true impact of parental anxiety.

Implications

This study emphasises the importance of considering the child in the context of their family. Maternal anxiety is a key factor in predicting chronicity in the course of a child's abdominal pain. Other studies have demonstrated an association between parental anxiety and recurrent abdominal pain in children (17;23), however this is the first to identify maternal anxiety as an independent predictor of adverse outcome in children with recurrent abdominal pain. The mechanisms by which maternal anxiety might confer this increased risk (if it is a causal risk factor) remain to be elucidated, and are likely to include both genetic and environmental transmission (e.g. anxiety affecting parental responses to symptoms, possibly leading to an increased risk of recurrence as the child might associate pain with desired parental attention (24)). Further work is still needed to elucidate whether interventions directed at a parent with anxiety would also be effective in treating the symptoms of recurrent abdominal pain in children. There is reason to believe that interventions including parents might be effective, for example, a recent study looking at the effect of remission in maternal depression (25) showed that their children had a decrease in rates of psychological diagnoses.

The findings of this study also highlight the significant and continuing risk of adverse functioning experienced by children with recurrent abdominal pain, across a range of domains. As well as the increased risk of continuing abdominal pain and psychological difficulties this also includes the impact on school attendance. This may disrupt children's learning and affect peer interactions and relationships, potentially leading to them missing other social and developmental opportunities both at and outside of school. This again has implications for families as parents may have to miss work to be at home with their child.

In conclusion, this study highlights the importance of clinicians taking a whole family perspective and considering parental anxiety when a child presents to them with recurrent abdominal pain.

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Table 1
One year outcomes following Recurrent Abdominal Pain (RAP) at age 6 years.

Outcome at age 7 years	% in RAP group (n=860)	% in non-RAP group (n=6165)	Odds Ratio (95% Confidence Interval)	Adjusted OR *
Any further abdominal pain	85.5	53.5	5.10 (4.20, 6.21)	4.88 (4.01, 5.95)
>10 days off school	15.1	9.2	1.74 (1.42, 2.14)	1.89 (1.53, 2.33)
Any anxiety disorder	5.4	2.5	2.23 (1.60, 3.12)	2.36 (1.68, 3.32)
Any ADHD	2.4	1.9	1.28 (0.80, 2.05)	1.67 (1.03, 2.69)
Any Oppositional-conduct disorder	3.1	2.9	1.08 (0.72, 1.63)	1.29 (0.85, 1.96)
Any depressive Disorder	0.6	0.4	1.50 (0.57, 3.94)	1.73 (0.65, 4.59)

* controlling for maternal educational level and child gender

Table 2
Logistic regression showing predictors of outcomes at age 7 in the recurrent abdominal pain group

Predictor	Further abdominal pain* (Odds Ratio (95% C.I.))	School Absence* (Odds Ratio (95% C.I.))	Anxiety disorder* (Odds Ratio (95% C.I.))
headache	2.13 (1.39, 3.25)	1.37 (0.89, 2.11)	0.91 (0.48, 2.01)
limb pain	1.12 (0.68, 1.84)	1.71 (1.10, 2.65)	1.59 (0.77, 3.29)
Hyperactivity score	0.71 (0.39, 1.31)	1.16 (0.65, 2.09)	1.20 (0.47, 3.06)
Emotional score	0.76 (0.42, 1.36)	1.61 (0.95, 2.73)	4.39 (2.07, 9.26)
Peer problems	1.36 (0.56, 3.30)	1.21 (0.58, 2.52)	1.01 (0.35, 2.92)
Previous RAP (age 3 years)	1.37 (0.78, 2.40)	1.38 (0.85, 2.25)	0.46 (0.16, 1.38)
Maternal anxiety	2.57 (1.13, 5.86)	1.77 (1.04, 3.03)	2.72 (1.25, 5.92)

* controlling for maternal educational level, number of children in family and child gender