

Clinical and Sonographic Biomarkers in the Evaluation of Pediatric Recurrent Abdominal Pain

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Received: 25-07-2024 / Revised: 23-08-2024 / Accepted: 16-10-2024

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Conflict of interest: Nil

Abstract:

Introduction: Recurrent abdominal pain (RAP) affects 10-12% of children aged 5-15 years and poses a diagnostic challenge, as the majority of cases are functional with no identifiable organic cause. Mesenteric lymphadenopathy is commonly observed in children with RAP during ultrasonography (USG), but its clinical relevance remains uncertain. Additionally, psychosomatic factors, particularly stress, play a significant role in RAP symptom persistence. This study aimed to assess clinical and sonographic markers, including mesenteric lymphadenopathy, in RAP diagnosis and to explore the impact of psychosomatic factors on symptom severity and persistence.

Materials and Methods: This prospective study included 82 pediatric patients aged 5-15 years who met Apley's criteria for RAP, defined as at least three episodes of significant abdominal pain over three months. Clinical assessments involved pain characteristics, associated symptoms, and psychosomatic stressor evaluations. Diagnostic tests included complete blood count (CBC), urinalysis, and stool examinations, while abdominal USG was performed to assess mesenteric lymphadenopathy and other potential abnormalities. Follow-up USG was conducted after six months for patients with lymphadenopathy, and psychosomatic evaluations were repeated to assess their role in symptom persistence. Data analysis was performed using SPSS, with statistical significance set at $p < 0.05$.

Results: Of the 82 children (mean age 7.9 years), 56.1% were male. Periumbilical pain with diurnal variation was present in 92.68% of patients, and 41.46% reported psychosomatic stressors, primarily related to school performance. Mesenteric lymphadenopathy was detected in 17.07% of patients. Follow-up USG showed resolution in 85.71% of cases, but 58.33% of those with resolved lymphadenopathy continued to experience pain. Psychosomatic stressors were significantly associated with pain recurrence, particularly in the absence of organic findings.

Discussion: This study demonstrates that mesenteric lymphadenopathy, although frequently observed in children with RAP, may not be directly linked to pain persistence, as lymph node resolution did not always correspond to symptom resolution. Instead, psychosomatic factors, especially school-related stress, were more strongly associated with the persistence of RAP. These findings underscore the importance of considering psychological factors in the management of RAP and highlight the limited diagnostic utility of USG in functional cases. A holistic approach that integrates both medical and psychological interventions is crucial for improving outcomes in children with RAP.

Keywords: Recurrent abdominal pain (RAP) in children, Mesenteric lymphadenopathy, Psychosomatic stressors, Ultrasonography (USG), Brain-gut axis, Functional abdominal pain, School-related stress, Psychosomatic evaluation, Pediatric abdominal pain, Diurnal pain variation.

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Introduction

Recurrent abdominal pain (RAP) in children, defined by Apley as at least three episodes of abdominal pain over three months, affects 10-12% of children aged 5-15 years [1]. Although it is a frequent reason for pediatric consultations, distinguishing between organic and functional causes remains a challenge. Organic causes are identified in only 5-10% of cases, including

gastrointestinal infections and urinary tract disorders, while the majority are classified as functional, with no clear physical cause [2,3].

Mesenteric lymphadenopathy, defined as lymph nodes larger than 8mm, is a common finding in children with RAP during ultrasonography (USG), but its relevance to the pain is unclear. Some

studies suggest it may be an incidental finding, while others link it to infectious or inflammatory conditions [5]. USG remains a key tool in evaluating RAP, allowing non-invasive imaging of abdominal structures, though its utility in functional cases is debated.

Psychosocial factors, such as school-related stress and anxiety, are critical in functional RAP, affecting the brain-gut axis and altering gut function. Nearly half of the children with RAP have underlying stressors, influencing both the onset and persistence of symptoms [6]. This interaction underscores the importance of considering psychological aspects in diagnosis and treatment.

This study aims to assess the clinical and sonographic markers, especially mesenteric lymphadenopathy, in RAP diagnosis and to examine the role of psychosomatic factors in the persistence and severity of symptoms.

Materials and Methods

This prospective study was conducted over one year at R.N.T. Medical College, Udaipur, involving 82 pediatric patients aged 5-15 years who met Apley's criteria for recurrent abdominal pain (RAP) [1]. Inclusion required at least three episodes of significant abdominal pain over three months. Children with fewer episodes, critical illness, or lack of parental consent were excluded.

Clinical Evaluation

Each child's clinical assessment included a detailed medical history, focusing on pain characteristics and associated symptoms like nausea, vomiting, or constipation. Family history of gastrointestinal disorders was noted. Psychosomatic stressors, such as school-related stress, were assessed using structured questionnaires [6]. Physical exams

included anthropometric measurements and signs of organic disease.

Diagnostic Investigations

Initial tests included a complete blood count (CBC), urinalysis, stool examination, and other relevant tests based on clinical suspicion. Abdominal ultrasonography (USG) was performed using a 3-7.5 MHz transducer, focusing on identifying mesenteric lymphadenopathy (nodes >8mm) and any other abnormalities such as ovarian cysts or kidney enlargement [4].

Follow-Up and Psychosomatic Evaluation

Children with mesenteric lymphadenopathy had follow-up USG after six months to check for node resolution. During follow-up, psychosomatic stressors were re-evaluated using interviews to understand their impact on pain recurrence [6].

Data Collection and Analysis

Patient demographics, clinical features, USG findings, and psychosomatic evaluations were analyzed using SPSS. Chi-square tests assessed associations between clinical and sonographic findings, and psychosomatic stressors. A p-value <0.05 was considered significant. Primary outcomes included the presence and resolution of lymphadenopathy, with secondary outcomes focusing on stressor identification and RAP correlation.

Results

The study population consisted of 82 children aged 5-15 years, with a mean age of 7.9 years (SD \pm 2.69). Of these, 46 (56.1%) were male, and 36 (43.9%) were female. The majority of patients (62.19%) were in the 5-8 year age group, indicating that RAP is more prevalent in younger school-aged children, as discussed in Table 1.

Table 1: Demographic and Clinical Characteristics of Study Population

Variable	Number of Patients (n=82)	Percentage (%)
Age Group (Years)		
5-8	51	62.19
9-12	25	30.49
13-15	6	7.32
Gender		
Male	46	56.10
Female	36	43.90
Periumbilical Pain	76	92.68
Diurnal Pain Variation	81	98.78
Constipation	11	13.41

Clinical Features

- **Pain Characteristics:** 92.68% of children experienced periumbilical pain, typically with diurnal variation. Most pain episodes occurred

in the morning before school, affecting daily activities and school attendance. Only 1.22% reported nocturnal pain.

- **Associated Symptoms:** Constipation was noted in 13.41% of cases, and 41.46% of children

reported psychosomatic stressors, primarily related to school performance or peer interactions. These stressors were found to exacerbate symptoms in many cases (6).

Sonographic Findings: As shown in Table 2, Ultrasonography revealed mesenteric lymphadenopa-

thy in 14 children (17.07%). Other findings included an ovarian hemorrhagic cyst in one child (1.22%) and an enlarged solitary kidney in one case (1.22%). No significant gastrointestinal structural abnormalities were identified in the majority of patients.

Table 2: Ultrasonography and Laboratory Findings in RAP Patients

Finding	Number of Patients (n=82)	Percentage (%)
Mesenteric Lymphadenopathy	14	17.07
Resolved Lymphadenopathy on Follow-Up	12	85.71
Persistent Abdominal Pain Despite Resolution	7	58.33
Ovarian Hemorrhagic Cyst	1	1.22
Enlarged Solitary Kidney	1	1.22

Upon follow-up at six months, 12 of the 14 children with mesenteric lymphadenopathy (85.71%) showed resolution of lymph node enlargement on USG. However, seven of these children (58.33%) continued to experience abdominal pain despite the resolution of the lymphadenopathy, indicating that the presence of lymphadenopathy may not be directly related to the persistence of pain.

Psychosomatic Stressors: Table 3 describes School-related stress was the most commonly identified psychosomatic factor, reported in 34 children (41.46%). Other stressors included family issues or peer-related concerns. Stress appeared to worsen symptoms, particularly during the school term. Children with identifiable psychosomatic stressors had a higher likelihood of pain recurrence, even in the absence of significant sonographic findings.

Table 3: Relationship Between Psychosomatic Stressors and RAP

Psychosomatic Stressor	Number of Patients (n=82)	Percentage (%)
Identified Stressor	36	43.90
No Stressor Identified	46	56.10
Most Common Stressor: School-Related	34	41.46

Discussion

The results of this study highlight several important aspects of RAP in children. First, the demographic findings indicate that RAP predominantly affects children aged 5-8 years, consistent with previous literature [2]. The slight male predominance is in line with some reports but differs from others, which suggests gender differences may vary across populations.

Periumbilical pain, reported by the majority of patients, is a common symptom of functional abdominal pain syndromes such as irritable bowel syndrome (IBS). [7-10] The diurnal variation observed in nearly all cases further supports the functional nature of the pain, as organic causes typically do not exhibit such clear day-night patterns [11]. This suggests that factors such as morning anxiety related to school may exacerbate symptoms.

The presence of **constipation** in a subset of patients (13.41%) is consistent with previous studies, which have linked functional constipation to abdominal pain in children [6]. While constipation was not a predominant finding, it underscores the importance of a thorough clinical assessment in identifying modifiable causes of RAP. [12]

Mesenteric Lymphadenopathy was identified in 17.07% of children, a finding consistent with other studies [5]. However, the resolution of lymphadenopathy in most cases without a corresponding resolution of symptoms suggests that lymphadenopathy may not be the primary cause of RAP in many children. This aligns with studies indicating that mesenteric lymphadenopathy may often be an incidental finding, especially in children with viral infections or transient gastrointestinal conditions [4]. Therefore, while USG remains valuable for ruling out serious organic pathology, its role in diagnosing functional RAP is limited. [13,14]

The high prevalence of **psychosomatic stressors** among children with RAP (41.46%) is a crucial finding. Previous research has demonstrated the significant impact of psychological factors, particularly stress and anxiety, on functional abdominal pain [15]. In this study, stress related to school performance and peer interactions was the most common factor exacerbating symptoms. Children with identifiable stressors were more likely to have persistent or recurrent pain, even in the absence of organic findings. [16] This emphasizes the importance of incorporating psychological evaluation and management into the

treatment of RAP, as addressing these stressors can lead to symptom improvement in many cases [8].

Conclusion

The findings of this study suggest that while mesenteric lymphadenopathy is a common sonographic finding in children with RAP, its clinical significance may be limited, as symptom resolution does not always coincide with the resolution of lymphadenopathy. Psychosomatic factors, especially school-related stress, play a significant role in the persistence and severity of RAP, highlighting the need for a holistic approach to diagnosis and management that includes both medical and psychological interventions.

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