

## Recurrent Abdominal Pain in Children: Etiological Spectrum and Utility of Baseline Investigations – A Prospective Study in a Tertiary Care Hospital.

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**Cite this paper as:** Dr Ravindra Raghu Bobade (2017) Recurrent Abdominal Pain in Children: Etiological Spectrum and Utility of Baseline Investigations – A Prospective Study in a Tertiary Care Hospital.. Journal of Neonatal Surgery, 6, (4) 92-97

### ABSTRACT

**Background:** Recurrent abdominal pain (RAP) is a common complaint in children. This study was conducted to determine the etiological spectrum and evaluate the utility of baseline investigations in children with RAP. **Methods:** This prospective observational study was carried out in the Department of Pediatrics of a tertiary care hospital from 1 May 2016 to 31 July 2016. A total of 124 children aged 5–15 years satisfying the modified Apley’s criteria were enrolled. Detailed history, clinical examination, and baseline investigations (complete blood count, ESR, urine routine and microscopy, stool examination for ova/cysts, and abdominal ultrasonography) were performed in all cases. Rome III criteria were used to classify functional gastrointestinal disorders. **Results:** Organic causes were identified in 38 children (30.6%), while 86 children (69.4%) had functional abdominal pain disorders. The common organic etiologies were urinary tract infection (9.7%), mesenteric lymphadenitis (7.3%), chronic constipation (6.5%), and renal calculi/hydronephrosis (4.0%). Parasitic infestation was seen in only 3.2% of cases. Baseline investigations (particularly urine analysis and ultrasonography) detected 89.5% of organic cases. **Conclusion:** Functional abdominal pain disorders constitute the majority of RAP cases in children. Simple baseline investigations have high diagnostic yield and should be used as the initial work-up in tertiary care settings. This approach helps in identifying treatable organic causes while avoiding unnecessary invasive tests....

**Keywords:** Recurrent abdominal pain, functional abdominal pain, irritable bowel syndrome, organic causes..

### INTRODUCTION

Recurrent abdominal pain (RAP) is one of the most common complaints encountered in pediatric outpatient practice, affecting approximately 10–20% of school-going children [1]. It is associated with significant morbidity, including repeated school absenteeism, impaired quality of life for the child, and considerable parental anxiety and healthcare utilization. [2] The classic definition of RAP was proposed by Apley and Naish in 1958 as “Episodes of abdominal pain occurring over a period of three or more months that interfere with the child’s normal daily activities.” This definition, based on their field survey of 1,000 school children, has been widely used for decades [3]. With the advent of the Rome III criteria in 2006, most cases of RAP are now classified under functional gastrointestinal disorders, including irritable bowel syndrome (IBS), functional dyspepsia, functional abdominal pain, and abdominal migraine. [4]

Pain is classified as either organic or non organic, depending on whether a specific cause of the pain is identified. Approximately 10% of students who experience abdominal pain seek medical evaluation. Early investigation found an organic cause for RAP in 5-10% of children [5]. Literature consistently shows that 70–95% of RAP cases in children are functional (non-organic) in origin, while organic causes are identified in 5–30% of cases, with higher yields reported in developing countries. Common organic etiologies include chronic constipation, parasitic infestations (e.g., giardiasis, ascariasis), urinary tract infections, lactose intolerance, Helicobacter pylori infection, urolithiasis, and, less commonly, inflammatory bowel disease or other structural abnormalities. The etiological spectrum varies significantly by geographic region, socioeconomic status, dietary habits, and environmental factors. [2,6].

A thorough history and detailed physical examination supplemented by simple, non-invasive baseline investigations remain the cornerstone of evaluation. The 2005 NASPGHAN and American Academy of Pediatrics guidelines emphasized that extensive or invasive testing is not routinely required in the absence of red-flag signs (such as weight loss, growth failure, fever, nocturnal pain, or gastrointestinal bleeding) [4]. However, the diagnostic yield of these basic tests (complete blood count, ESR, urinalysis, stool examination, and abdominal ultrasound) differs across settings, highlighting the importance of region-specific data to guide rational clinical practice and minimize unnecessary investigations. Despite several studies on RAP, there is a need for continued local audits, particularly in tertiary care settings in developing countries where infectious and nutritional causes may be more prevalent. The present study was therefore conducted to delineate the etiological spectrum of recurrent abdominal pain in children aged 5–15 years and to evaluate the diagnostic utility of routinely performed baseline laboratory and imaging investigations in a tertiary care hospital.

## Methodology

**Study Design:** This prospective observational study was conducted in the Department of Pediatrics at a tertiary care teaching hospital.

**Study Period:** The study was carried out over a period of three months from 1 May 2016 to 31 July 2016.

**Study Population:** Children aged 5–15 years presenting with recurrent abdominal pain to the pediatric outpatient department (OPD) or admitted in the pediatric ward were screened for enrollment.

### Inclusion Criteria

Age 5–15 years

History of at least three episodes of abdominal pain occurring over a period of three or more months that interfered with normal daily activities (modified Apley's criteria)

Informed written consent from parent/guardian and assent from children above 7 years of age

### Exclusion Criteria

Acute abdominal pain of less than three months' duration

Known chronic illness (e.g., tuberculosis, inflammatory bowel disease, malignancy, epilepsy, or previously diagnosed organic gastrointestinal disorder)

History of abdominal surgery

Severe malnutrition or significant neurological impairment.

**Sample Size:** A total of 124 consecutive children satisfying the inclusion criteria were enrolled during the study period.

**Data Collection:** A pre-designed, structured proforma was used to record:

Detailed history: site, character, frequency, duration, severity, aggravating/relieving factors of pain, relation to meals, associated gastrointestinal symptoms (vomiting, constipation, diarrhea, bloating), urinary symptoms, dietary history, school absenteeism, psychosocial stressors, and family history.

Complete physical examination including anthropometry (weight, height, BMI), general examination, and detailed abdominal and systemic examination.

Red-flag signs (e.g., involuntary weight loss, growth failure, fever, nocturnal pain, gastrointestinal bleeding, localized tenderness, or perianal abnormalities) were specifically documented.

**Baseline Investigations:** The following first-line investigations were performed in all enrolled children:

Complete blood count (CBC) – hemoglobin, total leukocyte count, differential count, platelet count

Erythrocyte sedimentation rate (ESR)

Urine routine and microscopic examination (including culture if indicated)

Stool examination for ova, cysts, parasites, and occult blood (three consecutive samples)

Abdominal ultrasonography

### Diagnostic Criteria

**Organic etiology:** Presence of a definite abnormality on baseline or additional investigations that could explain the symptoms and showed clinical improvement with specific treatment.

**Functional etiology:** No identifiable organic cause after completion of baseline work-up and fulfillment of Rome III criteria for functional gastrointestinal disorders (irritable bowel syndrome, functional dyspepsia, functional abdominal pain, or abdominal migraine).

**Ethical Considerations:** The study protocol was approved by the Institutional Ethics Committee (IEC) of the hospital prior to initiation. Written informed consent was obtained from the parent/guardian of every participant, and assent was taken from children. All data were kept confidential and used solely for research purposes.

**Statistical Analysis:** Data were entered into Microsoft Excel and analyzed using SPSS version 20.0. Continuous variables were expressed as mean  $\pm$  standard deviation (SD), while categorical variables were expressed as frequencies and percentages.

## Results

A total of 124 children aged 5–15 years with recurrent abdominal pain were enrolled during the study period from 1 May 2016 to 31 July 2016.

**Table 1: Demographic Profile of Study Participants (n=124)**

| Parameter | Group                 | Frequency           | Percentage |
|-----------|-----------------------|---------------------|------------|
| Age group | 5–10 years            | 74                  | 59.7%      |
|           | Age group 11–15 years | 50                  | 40.3%      |
| Gender    | Male                  | 72                  | 58.1%      |
|           | Female                | 52                  | 41.9%      |
| Residence | Urban                 | 51                  | 41.1%      |
|           | Rural                 | 71                  | 57.3%      |
|           | Mean age $\pm$ SD     | 9.8 $\pm$ 2.7 years | -          |

The majority of children were in the 5–10 years age group. There was a slight male predominance. More than half of the study participants belonged to rural background.

**Table 2: Demographical and Clinical Features of Patients**

| Parameter                  | Category                | Organic (n=38) | Nonorganic (n=51) | Functional | IBS (n=35) |
|----------------------------|-------------------------|----------------|-------------------|------------|------------|
| Age                        | 5-10 years              | 28             | 38                |            | 8          |
|                            | 11-15 years             | 10             | 13                |            | 27         |
| Sex                        | Male:Female             | 19:19          | 25:26             |            | 18:17      |
| Duration                   | 3-6 months              | 22             | 35                |            | 12         |
|                            | >6 months               | 16             | 16                |            | 23         |
| Site of pain               | Epigastric              | 11             | 22                |            | 8          |
|                            | Periumbilical/Umbilical | 12             | 18                |            | 9          |
|                            | Lumbar/Flank            | 9              | 7                 |            | 3          |
|                            | Iliac fossa / Others    | 6              | 4                 |            | 15         |
| Frequency of pain          | Daily                   | 8              | 10                |            | 5          |
|                            | Weekly                  | 18             | 28                |            | 13         |
|                            | Monthly                 | 12             | 13                |            | 17         |
| Character of pain          | Colicky                 | 23             | 29                |            | 12         |
|                            | Dull aching / Burning   | 15             | 22                |            | 23         |
| Pain related to food       | Increased               | 9              | 5                 |            | 2          |
|                            | Decreased / No change   | 29             | 46                |            | 33         |
| Pain related to defecation | Relief on defecation    | 3              | 5                 |            | 14         |
|                            | No relation             | 35             | 46                |            | 21         |

Organic cases were more common in younger children (5–10 years) and had higher frequency of red-flag signs. IBS patients

more frequently reported relief of pain with defecation and longer duration of symptoms.

**Table 3: Etiological Spectrum of Recurrent Abdominal Pain (n=124)**

| Final Diagnosis                            | Number    | Percentage   |
|--|-----------|--------------|
| <b>Functional Abdominal Pain Disorders</b> | <b>86</b> | <b>69.4%</b> |
| Irritable Bowel Syndrome                   | 35        | 28.2%        |
| Functional Abdominal Pain                  | 32        | 25.8%        |
| Functional Dyspepsia                       | 19        | 15.3%        |
| <b>Organic Causes</b>                      | <b>38</b> | <b>30.6%</b> |
| Urinary Tract Infection                    | 12        | 9.7%         |
| Mesenteric lymphadenitis                   | 9         | 7.3%         |
| Chronic Constipation                       | 8         | 6.5%         |
| Renal calculi / Hydronephrosis             | 5         | 4.0%         |
| Parasitic infestation                      | 4         | 3.2%         |

Functional disorders accounted for the majority (69.4%) of cases. Among organic causes, urinary tract infection was the leading etiology followed by mesenteric lymphadenitis.

**Table 4: Diagnostic Yield of Baseline Investigations (n=124)**

| Investigation                               | No. of Abnormal Results | Percentage |
|---|-------------------------|------------|
| Urine routine & microscopy ( $\pm$ culture) | 12                      | 9.7%       |
| Abdominal ultrasonography                   | 15                      | 12.1%      |
| Stool examination (Ova/Cysts)               | 4                       | 3.2%       |
| Complete Blood Count                        | 13                      | 10.5%      |
| Elevated ESR                                | 9                       | 7.3%       |

Simple baseline investigations (especially urine analysis and ultrasonography) showed good diagnostic yield and identified the cause in 34 out of 38 (89.5%) organic cases. Overall in this study of 124 children, organic etiology was detected in 30.6% while 69.4% had functional abdominal pain disorders. Baseline investigations proved highly effective for identifying treatable organic causes.

## Discussion

The present study, conducted on 124 children aged 5–15 years with recurrent abdominal pain (RAP), found that functional abdominal pain disorders accounted for 69.4% of cases, while organic causes were identified in 30.6%. Our finding of 30.6% organic causes is comparable to the observations of Reddy et al. (2014) [5], who reported organic etiology in 34% of 100 children using similar baseline investigations (urine analysis, stool examination, and abdominal ultrasound). In their study, urinary tract infection (11%), worm infestation (10%), and renal calculi (10%) were the leading organic causes. In the present study, urinary tract infection (9.7%) remained a prominent organic etiology, while mesenteric lymphadenitis (7.3%) was also significant, largely detected by ultrasonography. The relatively lower rate of parasitic infestation (3.2%) in our cohort compared to Reddy et al. [5] may reflect regional differences in hygiene and sanitation practices.

Similar results were reported by other Indian and international studies during this period. Plunkett and Beattie (2005) [2] reviewed that organic disease is found in up to 30% of children with RAP in some hospital-based cohorts, particularly in developing countries where infections and parasitic infestations are more prevalent. Devanarayana et al. [6] (2009) in Sri Lanka noted that while functional disorders predominate, organic causes such as parasitic infections, constipation, and urinary tract infections are common in resource-limited settings. A study by Alfvén [7] (2003) on 100 consecutive cases also highlighted the importance of distinguishing functional from organic pain through systematic evaluation.

The high diagnostic yield of baseline investigations in our study (urine analysis and ultrasonography identifying the majority

of organic cases, with 89.5% of organic etiologies detected by first-line tests) reinforces the recommendations of the 2005 NASPGHAN and American Academy of Pediatrics guidelines [4]. These guidelines emphasized that extensive or invasive testing is unnecessary in the absence of red-flag signs and that simple, non-invasive tests like CBC, ESR, urinalysis, stool examination, and ultrasound are sufficient in most cases. Quak [1] (2015) similarly advocated a stepwise clinical approach with judicious use of basic investigations, reporting good yield in identifying treatable causes such as UTI and parasitic infections.

Functional disorders, particularly irritable bowel syndrome (28.2%), functional abdominal pain (25.8%), and functional dyspepsia (15.3%), formed the bulk of cases in our study. This pattern is consistent with Rome III criteria-based classifications used in studies from 2006 onwards. The higher frequency of pain relief with defecation in the IBS subgroup further validates symptom-based diagnostic criteria. Bufler et al. [8] (2011) stressed the biopsychosocial model in the management of functional RAP, highlighting the role of psychosocial stressors, which were also noted in our cohort through history-taking. Studies consistently showed that a thorough history and physical examination, combined with selective baseline investigations, allow for efficient diagnosis while minimizing unnecessary procedures and parental anxiety.

### Conclusion

The results of this study are in concordance with similar works confirming that functional disorders predominate in children with recurrent abdominal pain, while simple baseline investigations have substantial diagnostic value in detecting organic causes, particularly in tertiary care settings in developing countries. This approach supports rational, cost-effective management and reduces the burden of unnecessary investigations.

### Limitations

The present study was single-center study with hospital-based design and short study duration, which may limit generalizability to community settings. Nevertheless, the prospective design and uniform application of standardized criteria strengthen its findings.

**Funding:** None

**Conflict of Interest:** Nil.

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