

## Ultrasonographic Findings in Children with Chronic Abdominal Pain

Anjali Khotle, Richa Chaudhary\*

Department of Pediatrics, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi (M), Wardha, Maharashtra, India

### ABSTRACT

Abdominal pain is one symptom for which children visit the pediatrician very often and it is a cause of concern for both the parents and the treating doctor and hence it has become a common practice to order a battery of investigations including an Ultrasonography (USG) which is usually not required. Hence this study will help to throw some light on the management of patients with CAP and also will help plan future larger studies in this field.

**Objectives:** To study the Ultrasonographic findings in patients with Chronic Abdominal Pain.

**Methodology:** During the study period of 1 year that is between September 2020 to August 2021 all the children visiting the pediatric OPD and admitted in the wards of pediatric department with the complaint of chronic abdominal pain fulfilling the inclusion criteria will be included in the study once their parents give consent for their participation. Patients' history (including type, location, duration and progression of pain, medications, number of days of school abstinence due to pain, any stressors in the family or school, previous hospital admissions), whether fulfilling ROME IV Criteria, examination, and USG findings and other investigations if done will be documented in the predesigned proforma. The data thus obtained will be analyzed by using Stata 10 software.

**Conclusion:** CAP is usually benign in children and investigations including USGs are often not required. The knowledge of USG findings in majority of children with CAP will help the treating doctors understand the disease better and prevent unnecessary investigations also it will help them to explain the treatment strategy and outcome of CAP to parents in a better way.

**Key words:** Chronic Abdominal Pain (CAP), Ultrasonography findings, ROME IV criteria

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**Corresponding author:** Richa Chaudhary

**e-mail** ✉: mpatil98dent@gmail.com

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### INTRODUCTION

A familiar complaint for which school going children are referred to the pediatric OPD is Chronic Abdominal Pain. In developing nations around 10-12% [1] of school going children has this complaint but only 5 to 10% children have an organic origin behind it [2]. The patient presents with the history of pain in abdomen which is typically per umbilical and is sometimes associated with other features like nausea and vomiting. Many organic causes can also lead to CAP like infections, inflammation or obstruction to a hollow viscus but patient usually will have other symptoms to point to the diagnosis and

Functional Gastrointestinal diseases (FGIDs) can be diagnosed clinically based on the recent ROME criteria and extensive investigations should be avoided. The FGIDs is believed to be having multifactorial etiology. The important factors responsible for CAP are altered brain gut interaction and psychological disorders in children. Association of CAP with common psychological disorders like depression and anxiety is also seen in children. In 1958 Apley for the first time defined Chronic or Recurrent Abdominal Pain as "three episodes of abdominal pain occurring in the space of three months, severe enough to affect daily activities" [3]. As the years passed by, the definition of CAP also evolved along with the progression of Rome I to Rome III criteria [4] and currently involving the Rome IV Criteria which defines CAP as abdominal pain which occurs for 2 months with at least one episode of pain/week severe enough to affect child's normal activity [5,6]. The researchers in the recent years, have pointed out that FGID's can be diagnosed clinically on the basis of symptoms and examination and there is no need for extensive workup to exclude other organic causes of CAP. This concept

has been followed in ROME IV and hence all definitions of FGIDs have “The symptoms cannot be ascribed to a different medical condition, after a relevant medical evaluation”. The definition in ROME III included the term “no evidence of organic disease” and hence the focus was on investigations to rule out organic diseases causing CAP. This new definition of FGIDs in ROME IV allows the physician to make a diagnosis of CAP with no or minimum investigations. The ROME IV criteria is based on symptom based approach which helps clinicians to diagnose various Functional disorders in children based on proper history and physical examination without need of any investigations. The presence of alarm symptoms may point towards the organic cause but in the absence of these diagnostic studies are not helpful in making the diagnosis. ROME IV criteria has included a new term “Functional abdominal pain not otherwise specified” and hence all those functional disorders which do not fit in any of the specific diagnosis like functional dyspepsia, abdominal migraine or irritable bowel disease can be classified under this group. CAP is a frequent complaint during Pediatric OPD practice and abdominal sonography is routinely advised to find out the cause of such complaint. But it is important to understand that rather than advising the battery of investigations for the child medical team should focus on educating the parents that though abdominal pain like headache is a common complaint of the children and adolescent only few of them have a disease. In developing countries with limited resources unnecessary ultrasonography (USG) in patients with CAP pose a great burden on the society hence this study is being planned to find out the USG findings in patients with Chronic abdominal pain and their relevance in the management of patients with CAP.

### Objectives

To assess the USG data of patients suffering from chronic abdominal pain.

To assess multiple factors contributing to chronic abdominal pain in children.

## MATERIALS AND METHODS

### Study design

Patients visiting the pediatric OPD or admitted in wards between September 2021-August 2022 due to chronic abdominal pain will be included in this prospective observational study.

### Setting

This study will be conducted in department of Pediatrics AVBRH over a period of 1 year.

The study will proceed as follows

- ✓ Children visiting OPD or admitted in wards during the study period with the complaint of RAP Meeting the inclusion criteria (N)
- ✓ Patients excluded due to various reasons

- ✓ Patients enrolled in the present study (n)
- ✓ History, examination and USG findings to be documented in the predesigned proforma by the pediatrician (On duty consultant or 3rd year resident)
- ✓ Assessment of various USG findings in RAP using Stata 10 Software

### Inclusion criteria

All children with CAP between the age group of 4-15 years visiting the OPD or admitted in the wards during the study period will be included in the study after obtaining consent from the parents.

### Exclusion criteria

Refusal to give consent.

Children already diagnosed with some organic cause of abdominal pain.

### Study size

We will include 72 children with chronic abdominal pain.

Following formula was used to calculate the sample size

Population size (N): 5000

Hypothesized % frequency of outcome factor in the population (p): 5% ± 5

Confidence limits as % of 100(absolute ± %)(d): 5%

Design effect (for cluster surveys-DEFF): 1

Confidence interval: 95%

Formula: Sample size  $n = \frac{DEFF * Np(1-p)}{[(d^2 / Z_{21-\alpha/2}^2 * (N-1) + p(1-p))]$

Sample size required: 72

## RESULTS

All the children visiting the Pediatric OPD or admitted in the wards experiencing chronic pain in the abdomen during the study period will be included. ROME IV criteria will be used for the evaluation of the patients. The patients with some organic cause for abdominal pain like urinary tract infection or inflammatory bowel disease and those not giving consent for the participation in the study will be excluded. The children with alarm symptoms will be investigated according to the clinical diagnosis and all the children included in the study will be sent for USG. The USG findings of the participants will be documented and analyzed along with other aspects of patient's history.

The results obtained will be documented under the headings demographic profile and the main results. We will study the age and sex wise distribution of CAP in children and also the distribution of different USG findings according to age and sex. The USG findings are more beneficial in cases where abdominal pain gets worse often or in clinically skeptical conditions

and are more significant in patients with history of alarming symptoms as compared to those having no history of alarming conditions. Thus, we expect that USG will be normal in all those cases where our clinical diagnosis is Functional abdominal pain. Also Mesenteric lymphadenopathy (MLN) is the commonest finding in children with CAP which is described as having lymph nodes ranging in number from 3 or more than that and having a size > 5 mm in short axis [7,8]. Primary MLN is when there is no other Ultrasonographic finding and secondary when it is associated with some pathology [9]. MLN is insignificant when the size is less than 5mm in short axis (or less than 10 mm in long axis). Previous literature available on CAP suggests that there is significant association between CAP and emotional stress. The date of onset of pain in such conditions is usually linked to some stressful event in the past, some bad memories of school (any stressors) or birth of a sibling etc. Abnormalities in gastrointestinal mobility along with visceral insensitivity are also seen in cases corresponding to some traumatizing events or going through high emotional stress. Thus we will study the association of such an event and CAP in children and also other factors like meals consumed outside, history of junk food consumption, fruit intake and other dietary habits will be studied and whether they are statistically significant ( $p$  value < 0.05). We expect the USG will be either normal or will have only MLD which is benign and has good prognosis in the absence of any other USG findings.

### DISCUSSION

CAP is a very common ailment among pediatric patients but is usually benign in nature though distressing for the child and the parents. The treating doctor should rule out any organic cause for the child's symptoms through proper history and investigations. Our study is being planned to find out the USG findings and the various risk factors associated with CAP in children. Many earlier researchers have studied the Ultrasonographic findings in children with chronic abdominal pain and have found either a normal ultrasonography or mesenteric lymphadenopathy which is a nonspecific finding unless there is some other associated abnormality detected in the USG. The patients in whom there is no clue of organic disease on history and examination do not have significant USG findings and we expect the same results in our study group.

The aim of the present study is to make the clinicians aware that most of the time CAP in children is a functional disorder and this diagnosis can be easily established on clinical grounds with no need of diagnostic workup in most of the cases. Our goal should be to return the child to normal function and explain the parents that complete disappearance of pain is not the aim. Medications should be used judiciously to relieve individual patient symptoms. Treatment modalities include acid reduction therapy, antispasmodics, laxatives and psychotropic agents

based on individual patient symptoms. The results of few similar studies in children are discussed below. A study conducted by Boey et al states prevalence of CAP as 10.2% among Malaysian school children. In this study it was observed that CAP peaks at two age groups i.e. at 4-6 years and then at 7-12 years [10,11]. Helgeland, et al. studied 152 patients with CAP, out of these 124 patients (87%) have functional gastrointestinal disorders (FGID) according to the Rome III Criteria and 8 patients were found to have organic cause of CAP. They concluded that ROME III was effective tool for diagnosing FGID [12]. Bal Krishnan et al studied 110 cases of CAP and 138 controls. CAP was found in both the sexes with male: female ratio of 1:1.07. It was observed that 84 (72.1%) cases of CAP have Mesenteric lymph nodes (MLN) on ultrasonography as compared to 41 (13.4%) of controls. The study observed 62 (56.4%) of 110 children with CAP had significant MLN, in contrast to 16 (11.6%) of 138 controls ( $p < 0.001$ ). Right iliac fossa (79%) followed by periumbilical location (77.4%) was the most common location for the enlarged nodes [13].

In a study by Deva Narayana et al recurrent abdominal pain (RAP) was studied in randomly selected school children and it was observed that 10.4% have history of RAP. Out of these 58.4% had mild to moderate symptoms and 41.6% had severe symptoms? It was observed that there was a significant association of RAP with stressful life event and family history of RAP [14]. In a study by Wisniewska S G et al 49.6% of children with mesenteric lymphadenopathy had abdominal pain and was observed to be the commonest cause for MLN [15]. Many researchers in the past have documented association of CAP and MLN [7,8,13,16,17]. A study of around 189 children, conducted by Vayner, et al. having chronic abdominal pain, concluded that 61.4% of the children had mesenteric lymphadenopathy as compared to only 10 % in control group ( $p$  value < 0.001) [18]. In a study by Jacob et al 500 patients of abdominal pain were studied and it was observed that enlarged Mesenteric lymph nodes were present in 25% of the asymptomatic patients and 27.2 % of the patients with abdominal pain. The study concluded that mesenteric lymphadenopathy is a nonspecific finding and further evaluation of the patient with MLN depends on the clinical condition of the patient and other USG findings [19].

MLN in the absence of other USG findings is benign in nature and has a good prognosis and this should be conveyed to the parents. The present study will help to analyze and assess the distribution of symptoms and USG findings among children with CAP. The limitations of this study are that long term follow up of these children is not the part of the study and thus the natural history of CAP cannot be concluded. Further larger studies should be planned in the future to address this issue [20-24].

### CONCLUSION

The knowledge about the USG findings among the patients with CAP will help the treating pediatrician

to plan the investigation strategy based on ROME IV Criteria and avoid unnecessary USGs done in patients with CAP. This will also guide the pediatricians to explain the parents the prognosis and the natural history of the disease with confidence and in a better way.

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