

## Mesenteric lymphadenopathy in children with chronic abdominal pain

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### Abstract

**Background:** Mesenteric lymphadenopathy is a common finding described by abdominal ultrasonography in children.

**Objective:** To estimate incidence and significance of mesenteric lymphadenopathy (MLN) in children with chronic abdominal pain (CAP) as compared to healthy children.

**Method:** A prospective observational study was conducted in the paediatric department of a tertiary care hospital. Cases included children of age group 5–15 years with CAP who were subjected to abdominal ultrasonography during the study period. Controls included children in whom abdominal sonography was performed for reasons other than abdominal pain. Descriptive statistics were used for the analysis of baseline characteristics of the study group. For the variables following normal distribution curve, mean and standard deviation were computed. The presence of enlarged nodes, their location, size and other significant findings were recorded. Pearson's Chi-square test was used to analyse categorical variables between groups.

**Results:** Three hundred and eighteen children were enrolled in the study. After excluding those who did not meet the criteria, the final study population included 110 cases and 138 controls. CAP was almost equal in both sexes with male: female ratio of 1:1.07. Mesenteric lymph nodes were detected by ultrasonography in 84 (72.1%) cases and in 41 (13.4%) controls. Significant MLN ( $\geq 5$  mm short axis or  $>10$  mm long axis) was present in 62 (56.4%) of 110 children with CAP, in contrast to 16 (11.6%) of 138 controls ( $p < 0.001$ ). Most common location of the nodes was in the right iliac fossa (79%) followed by peri-umbilical location (77.4%).

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**Conclusion:** MLN, with lymph nodes more than 5mm on their short axis, is a significant finding in children presenting with CAP.

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(Key words: Chronic abdominal pain, recurrent abdominal pain, mesenteric lymphadenopathy)

### Introduction

In developed countries, chronic abdominal pain (CAP) is a complaint of 10–12% school children<sup>1</sup>. However, an organic cause is found only in 5–10% of children with CAP<sup>2</sup>. There are very few studies that mention the prevalence and significance of mesenteric lymphadenopathy (MLN) in CAP<sup>3</sup>.

### Objective

To estimate the incidence and significance of MLN in children with CAP as compared to healthy children.

### Method

A prospective, single centre study was conducted in the paediatric department of Kasturba Medical College, Manipal, from October 2015 to July 2017, a period of 1 year and 9 months. Children aged 5–15 years, presenting with CAP, who were subjected to abdominal ultrasonography, were included as cases. Children who were subjected to abdominal sonography for reasons other than abdominal pain were included in the control group. Children with known organic causes for CAP (pancreatitis, dysmenorrhoea, abdominal TB, renal calculi etc.) were excluded from cases. Children with known cause for MLN e.g. gastroenteritis, malignancy, abdominal tuberculosis, rheumatic disorders etc. were excluded from cases as well as from controls. The study protocol was approved by the Institutional Ethics Committee. (IEC No. 641/2015). Written informed consent was obtained from the parents before inclusion in the study.

Data collected from history, physical examination and abdominal ultrasonography were recorded in a proforma designed for the study. Ultrasonography was performed by 2 experienced radiologists using Epiq-5G and Affiniti-50G units (Philips health care) with 8 MHz convex-array transducer and 12 MHz linear transducer. The presence of enlarged nodes, their location, size and other significant findings were recorded. Each lymph node was measured in two dimensions (short axis and long

axis). A size of more than 5mm in short axis or more than 10mm in the long axis was considered significant. Basic investigations were done according to case merit and the details were included.

The study data was processed using the Statistical Package for the Social Sciences (SPSS) V21.0. Descriptive statistics were used for the analysis of baseline characteristics of study group. For the variables following normal distribution curve, mean and standard deviation were computed. Pearson's Chi-square test was used in the analysis

of categorical variables between groups. Significance was assessed at 5% level using non parametric 2 tailed test. A *p*-value of <0.05 was considered statistically significant.

**Results**

A total of 318 children were enrolled in the study, which included 149 children with CAP (cases) and 169 controls. Among the 149 cases with CAP, 39 were excluded whilst 31 subjects were excluded from the control group. Thus, the final study population included 110 cases and 138 controls (Figure 1).

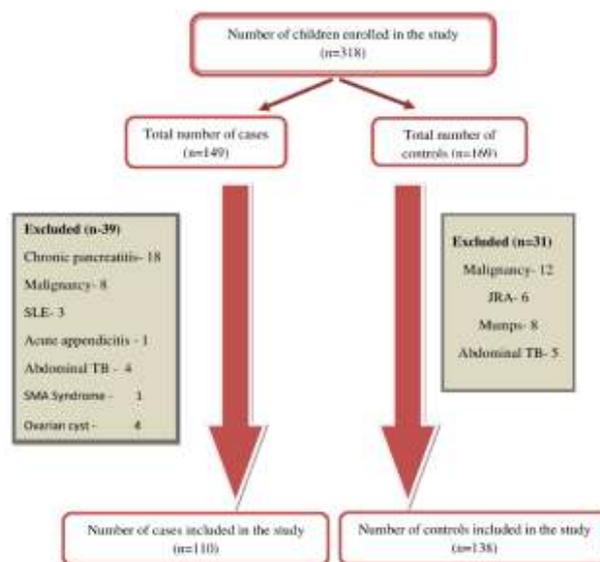


Figure 1. Study flow chart

Of the 138 controls, 46 had congenital anomalies and genetic syndromes where abdominal sonography was done to rule out renal/gastrointestinal malformations, 42 had renal disorders, 37 had hepatic disorders, 9 had pyrexia of unknown origin and 4 had miscellaneous disorders. CAP was almost equal in both sexes with a male: female ratio of 1:1.07. Mean age of the study group was 9.13 ± 3.3 years ranging from 5-15 years. In the present study there were 73 (66.3%) children aged

from 5 to 10 years and 37 (33.7%) children aged from 10-15 years. Higher frequency of CAP was observed in the younger age group. Mean weight of all children with CAP was 24.34 ± 9.8kg and control was 26.79 ± 12.65kg. Mean height of all the cases was 126.05 ± 17.9cm and controls was 127.25 ± 22.77cm. Out of the 110 cases, 33 (30%) and out of the 138 controls 33 (23.9%) were undernourished with BMI <3rd centile (Table 1).

**Table 1: Baseline demographic characteristics of the study group**

Variable	Cases (n=110)	Controls (n=138)
<b>Sex</b>		
Male (n=132)	53 (48.1%)	79 (57.2%)
Female (n=116)	57 (51.9%)	59 (42.8%)
<b>Age (years)</b>		
5-10 (n=156)	73 (66.3%)	83 (60.1%)
10-15 (n=92)	37 (33.7%)	55 (39.9%)
<b>Body mass index (kg/m<sup>2</sup>)</b>		
<3rd centile (n=66)	33	33
>3rd centile (n=182)	77	105
<b>Weight (kg) (mean ± SD)</b>	24.34 ± 9.88	26.79 ± 12.65
<b>Height (cm) (mean ± SD)</b>	126.05 ± 17.9	127.25 ± 22.77

The median duration of abdominal pain was 4 months with the 75<sup>th</sup> and 25<sup>th</sup> IQR being 7 and 3 months respectively. When duration was categorized, it was observed that 81 (73.6%) of the children had duration of pain between 3-6 months. Vomiting, fever and constipation were the main symptoms other than abdominal pain. (Table 2)

**Table 2: Symptoms and signs in children with chronic abdominal pain (n=110)**

Variable	Number (%)
Vomiting	27 (24.5)
Constipation	11 (10.0)
Fever	11 (10.0)
Pallor	28 (25.5)
Abdominal tenderness	18 (16.3)
Hepatomegaly	08 (07.3)

On physical examination, the most common finding was pallor. Out of 110 children with CAP only 16.3% had abdominal tenderness most commonly in the periumbilical region and right iliac fossa. Complete haemogram was done in all 110 cases. Eosinophilia was present in 40%, anaemia in 22.7%, leucocytosis in 22.9% and elevated erythrocyte sedimentation rate in 14.4%.

On ultrasonography (USG) MLN was detected in 76.3% of cases and in 29.7% of controls. Significant MLN ( $\geq 5$  mm short axis) was present in 56.4% of children with CAP, in contrast to 11.6% of controls. Difference between the two groups analysed by Pearson's Chi square test was statistically significant (Table 3).

**Table 3: Division of study group with reference to mesenteric lymph nodes in abdominal ultrasonography**

Mesenteric lymph nodes	Cases (n=110) Number (%)	Controls (n=138) Number (%)	p value*
Visualised (n=125)	84 (76.3)	41 (29.7)	<0.001
Not visualised (n=123)	26 (23.7)	97 (70.3)	
Significant MLN $\geq 5$ mm (n=78)	62 (56.4)	16 (11.6)	<0.001

\*Pearson's Chi square test

In the present study, MLN was more common among girls (58%) with CAP. MLN among controls was more common in boys (87.5%). Mean age of children among 62 cases with MLN was 8.4  $\pm$  3.1 years ranging from 5-15 years. Mean age of children among 16 controls with MLN was 10.4  $\pm$

3.6 years ranging from 5-15 years. No significant correlation of age was observed with MLN in this study ( $r=-0.314$ ,  $p=0.08$  (NS)). Most common location of the nodes was in the right iliac fossa (RIF) region (79%) followed by peri-umbilical location (77.4%) (Table 4).

**Table 4: Mesenteric lymphadenopathy based on location in ultrasonography of abdomen**

Site	Cases (n=62)	Controls (n=16)
Right iliac fossa (RIF)	14	05
Peri-umbilical	13	02
Peri-umbilical + RIF	24	06
Epigastric + Peri-umbilical + RIF + Left iliac fossa (LIF)	07	01
Peri-umbilical + RIF + LIF	04	02

### Discussion

Recurrent abdominal pain (RAP) was described as a symptom complex by a British paediatrician John Apley and he defined it as "pain that waxes and wanes, occurring at least 3 times over a period longer than 3 months and severe enough to affect a child's activities"<sup>4</sup>. The American Academy of Paediatrics (AAP) Subcommittee on Chronic Abdominal Pain 2005 replaced the term RAP with CAP and defined the latter as "long-lasting intermittent or constant abdominal pain that is either functional or organic". Abdominal pain lasting for more than 1-2 months is considered chronic<sup>5</sup>. Both RAP and CAP are being used interchangeably in clinical practice. However,

CAP is currently the preferred term as it encompasses RAP as well.

CAP is common among school children and young adolescents with prevalence ranging from 0.5 to 19%<sup>6-9</sup>. Boey *et al.* reported a prevalence of CAP of 10.2% among Malaysian school children<sup>6,7</sup>. Two age peaks are often seen; one at 4-6 years and the other at 7-12 years<sup>8-10</sup>. Incidence is uncommon in children below 5 years and those above 15 years of age. In our study, higher frequency of CAP was observed in the age group of 5-10 years. Both boys and girls were equally affected in our study, though many studies have shown female preponderance<sup>8,9</sup>. Most of the studies have reported that only 10% cases of CAP have an organic pathology. Studies

done in India have reported intestinal parasitic infection as one of the most important cause of CAP<sup>10</sup>. Gastroesophageal reflux disease (GERD) and constipation are the commonest causes of CAP in the developed countries<sup>11-15</sup>. An association between *H. pylori* and CAP has been postulated, but is controversial.<sup>14</sup> Studies have shown the presence of social and family stressors being associated with CAP. Some of the stressors include parental separation, domestic violence, school issues etc.<sup>11,13</sup>. As per ROME IV criteria, the term FGID (Functional gastrointestinal disorders) was replaced by the new terminology 'disorders of gut-brain interaction' - "a group of disorders classified by GI symptoms related to any combination of motility disturbances, visceral hypersensitivity, altered mucosal and immune function, gut microbiota, and/or central nervous system processing"<sup>16</sup>.

Abdominal ultrasonography is an important diagnostic tool performed to rule out an underlying organic abnormality. MLN is the commonest ultrasonographic finding in children with CAP, but its significance is rarely mentioned in the literature. Radiologically, MLN is used to describe the presence of 3 or more lymph nodes of size greater than 5mm in its short axis<sup>17-19</sup>. MLN is called primary, when there is no other ultrasonographically identified abnormality and secondary, when an associated pathology is detected<sup>19</sup>. A short axis of <5mm is considered insignificant<sup>20</sup>. MLN is commonly reported in children with acute abdominal pain and a few researchers have reported the significance of MLN in CAP as well<sup>17-20</sup>.

MLN was believed to be associated with acute appendicitis, lymphoma and intussusception<sup>21</sup>. Common aetiologies for MLN include viral infections, mainly adenovirus, Crohn's disease, gastroenteritis, HIV and *Yersinia enterocolitica*<sup>22-24</sup>. Significant MLN is defined as a size of more than 5mm in short axis (more than 10mm in the long axis)<sup>23,24</sup>. Similar to our study, a few studies have reported right lower quadrant of abdomen as the common site of location of MLN followed by the periumbilical region<sup>22-24</sup>.

This is a single centre prospective case control study to determine the presence and significance of mesenteric lymphadenopathy in children with CAP. This study showed that MLN is a common finding in children with CAP compared to asymptomatic children. Clinically significant MLN i.e. lymph nodes >5mm in short axis was significantly associated with chronic abdominal pain. Comprehensive laboratory investigations targeted to explore the aetiology of MLN were not performed in this study. We did not perform long-

term follow-up of the subjects which would be useful to evaluate the natural history of MLN. These are limitations of this study. Abdominal ultrasonography is a useful tool in the evaluation of CAP to rule out organic causes. When MLN is the only finding in abdominal ultrasonography, parents can be reassured regarding the benign nature of this finding and possible good prognosis.

### Conclusions

MLN, with lymph nodes more than 5mm on their short axis, is a significant finding in children presenting with CAP.

### References

1. Huang RC, Plamer LJ, Forbes DA. Prevalence and pattern of childhood abdominal pain in an Australian general practice. *Journal of Paediatrics and Child Health* 2000; **36**: 349-53.  
<https://doi.org/10.1046/j.14401754.2000.00513.x>  
PMid: 10940169
2. Apley J. The child with abdominal pain. 2<sup>nd</sup> edition. Blackwell Scientific Publications, Oxford 1975.p. 13-6; 24-25; 29.  
PMid: 1117020
3. Vayner N, Coret A, Polliack G, *et al*. Mesenteric lymphadenopathy in children examined by US for chronic and/or recurrent abdominal pain. *Pediatric Radiology* 2003; **33**: 864-7.  
<https://doi.org/10.1007/s00247-003-0985-7>  
PMid: 13679999
4. Apley J, Nash N. Recurrent abdominal pain: a field survey of 1000 school children. *Archives of Disease in Childhood* 1958; **33**:165-70.  
<https://doi.org/10.1136/adc.33.168.165>  
PMid: 13534750 PMCID: PMC2012205
5. American Academy of Pediatrics Subcommittee on Chronic Abdominal Pain. Chronic abdominal pain in children. *Pediatrics* 2005; **115**: 812-5.  
<https://doi.org/10.1542/peds.2004-2497>  
PMid: 15741394
6. Boey CC, Yap S, Goh KL. The prevalence of recurrent abdominal pain in 11-16 year-old Malaysian school children. *Journal of Paediatrics and Child Health* 2000; **36**: 114-6.

- <https://doi.org/10.1046/j.14401754.2000.00465.x>  
PMid: 10760006
7. Boey CC, Goh KL. Predictors of recurrent abdominal pain among 9 to 15 year-old urban school-children in Malaysia. *Acta Paediatrica* 2001; **90**: 353-5.  
<https://doi.org/10.1111/j.16512227.2001.tb00318.x>
8. Rasul CH, Khan MAD. Recurrent abdominal pain in school children in Bangladesh. *Journal of the Ceylon College of Physicians* 2000; **33**: 110-4.
9. Devanarayana NM, de Silva DGH, de Silva HJ. Recurrent abdominal pain syndrome in a cohort of Sri Lankan children and adolescents. *Journal of Tropical Pediatrics* 2008; **54**: 178-83.  
<https://doi.org/10.1093/tropej/fmm114>  
PMid: 18204085
10. Devanarayana NM, Rajindrajith S, De Silva HJ. Recurrent abdominal pain in children. *Indian Pediatrics* 2009; **46**(5): 389-99.  
PMid: 19478352
11. Chitkara DK, Rawat DJ, Talley NJ. The epidemiology of childhood recurrent abdominal pain in western countries: a systematic review. *American Journal of Gastroenterology* 2005; **100**: 1868-75.  
<https://doi.org/10.1111/j.15720241.2005.41893.x>  
PMid: 16086724
12. Stordal K, Nygaard EA, Bentsen B. Organic abnormalities in recurrent abdominal pain in children. *Acta Paediatrica* 2001; **90**: 1-5.  
<https://doi.org/10.1111/j.16512227.2001.tb02426.x>
13. Buch NA, Ahmad SM, Ahmad SZ, Ali SW, Charoo BA, Hussan MU. Recurrent abdominal pain in children. *Indian Pediatrics* 2002; **39**: 830-4.  
PMid: 12368527
14. Das BK, Kakkar S, Dixit VK, Kumar M, Nath G, Mishra OP. Helicobacter pylori infection and recurrent abdominal pain in children. *Journal of Tropical Pediatrics* 2003; **49**: 250-2.
- <https://doi.org/10.1093/tropej/49.4.250>  
PMid: 12929890
15. Eidlitz-Markus T, Mimouni M, Zeharia A, et al. Occult constipation: a common cause of recurrent abdominal pain in childhood. *Israel Medical Association Journal* 2004; **6**(11): 677-80.  
PMid: 15562805
16. Drossman DA, Hasler WL. Rome IV-functional GI disorders: disorders of gut-brain interaction. *Gastroenterology* 2016; **150**: 1257-61.  
<https://doi.org/10.1053/j.gastro.2016.03.035>  
PMid: 27147121
17. Sivit CJ, Newman KD, Chandra RS. Visualization of enlarged mesenteric lymph nodes at US examination. *Pediatric Radiology* 1993; **23**: 471-5.  
<https://doi.org/10.1007/BF02012457>  
PMid: 8255656
18. Watanabe M, Ishii E, Hirowatari Y, et al. Evaluation of abdominal lymphadenopathy in children by ultrasonography. *Pediatric Radiology* 1997; **27**: 860-4.  
<https://doi.org/10.1007/s002470050256>  
PMid: 9361045
19. Macari M, Hines J, Balthazar E, Megibow A. Mesenteric adenitis: CT diagnosis of primary versus secondary causes, incidence, and clinical significance in pediatric and adult patients. *American Journal of Roentgenology* 2002; **178**: 853-8.  
<https://doi.org/10.2214/ajr.178.4.1780853>  
PMid: 11906862
20. Karmazyn B, Werner EA, Rejaie B, Applegate KE. Mesenteric lymph nodes in children: what is normal? *Pediatric Radiology* 2005; **35**: 774-7.  
<https://doi.org/10.1007/s00247-005-1462-2>  
PMid: 15883829
21. Zhang, Liu Yingdong, Sun Hongguang, et al. Mesenteric lymph nodes in children with intussusception and its clinical significance [J]. *Journal of Clinical Medicine* 2008; **12**(3): 104-5.

22. Chanchlani R. Clinical profile and management of mesenteric lymphadenitis in children - Our experience. *International Journal of Orthopedics Traumatology and Surgical Sciences* 2015; **1**(1): 1-4.
23. Wever V. Abdominal ultrasonography in the diagnostic work-up in children with recurrent abdominal pain. *European Journal of Pediatrics* 1997; **156**: 787-8.  
<https://doi.org/10.1007/s004310050713>
24. Jacob V, Krishna Kumar AS. Mesenteric lymphadenitis in children presenting with abdominal pain. *Journal of Evolution of Medical and Dental Sciences* 2013; **47**(2): 9190-4.  
<https://doi.org/10.14260/jemds/1593>