



Original Article

Appraisal Of Enteralgia(Abdominal Pain) In Children And Its Interrelationship With Diagnostic Sonography”A Prospective Study

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ABSTRACT

Introduction: Abdominal pain in a child is one of the most common presentations with both trivial and life-threatening etiologies, ranging from functional pain to acute appendicitis. In the current era, ultrasonography is the most important and cost effective diagnostic modality in the evaluation of children with acute or chronic abdominal pain. As this is a non-ionizing imaging modality, curtailing the risk of exposure to ionizing radiation, it is vital to understand the yield of ultrasonography to diagnose various abdominal pathologies in children with abdominal pain.

Aims and objectives: To study the incidence of pain abdomen in children aged between 1 to 12 years and its etiopathological correlation with ultrasonography.

Methodology: This is a Prospective observational study conducted over a period of 18 months from January 2012 to June 2013 in the Pediatric department of Princess Esra Hospital, Deccan College of medical sciences, Hyderabad, Andhra Pradesh, India.

Results: A total of 100 cases were enrolled among which 51% were male children and 49% were female children. Majority of the cases (55%) were aged between 6-10yrs. The most important associated symptoms were fever and vomiting (75%). Mesenteric lymphadenitis was the commonest ultrasound finding.

Conclusion: This study showed that 96% of children had contributed to pain abdomen which is more common than functional cause 4%. Mesenteric lymphadenitis could be of organic etiology and is the main cause of recurrent abdominal pain in children. It is suggested



that further studies be carried out in this field.

Introduction

Abdominal pain in children is the most common clinical manifestation with variable underlying pathology which ranges from insignificant functional causes to potentially fatal diseases¹. Abdominal pain in children is the most common clinical manifestation with variable underlying pathology which ranges from insignificant functional causes to potentially fatal disease¹. Abdominal complaints are usually benign in children (e.g. constipation), however it is vital to recognize the key manifestations, which represent a more serious disorder¹. To determine the nature of abdominal pain in children is a demanding assignment with varying nature of the diseases among different age groups (i.e. Volvulus in neonates, intussusceptions in toddlers). Similarly assessing the etiological factors in a child with pain is equally demanding¹.

Abdominal pain of recent presentation along with associated signs and symptoms that point out an underlying organic pathology². This can vary from an insignificant self-limiting condition to a serious surgical cause². Pain abdomen along with vomiting or diarrhea is frequent manifestations in young children admitted to casualty³. Even though the clinical assessment of the child with acute pain abdomen is the gold standard, additional evaluation with ultrasonography to look for the potential pathology is equally vital in diagnosis and management⁴. Ultrasonography is the prime imaging modality in evaluating children with acute or chronic abdominal pain. Along with its cost effectiveness, the fastness and non-invasive nature, ultrasound has many utilities in comparison to other imaging tools. It enables uninterrupted communication with parents and the child⁵.

The non-ionizing nature of this modality has an additional advantage over other cost effective imaging techniques. More so in the pediatric population who are at risk for developing cancer due to ionizing radiation, in computed tomography. Hence, enhancing our understanding and knowledge of ultrasonographic details of various abdominal organs, their structures and the abnormal entities play a vital role in curtailing the need for ionizing modalities while evaluating the children with acute or recurrent abdominal pain⁵. Though its efficacy to achieve the final diagnosis is ambiguous in deep seated organ related diseases, it aids to rule out the superficial ones⁶. Recurrent abdominal pain (RAP) is one of the frequent gastrointestinal manifestations in children, occurring in 10% of school going children and adolescents⁷. Treating *H. pylori* with common antibiotics resulting in resistant and more perspectives are needed in developing new formulation for children resistance to common antibiotics, helps in eradicating or recurrent *H. pylori* infections¹¹. Children diagnosed with IBD were better tolerated on ispaghula and antispasmodics which improves the bowel habits of the children¹². And drug reaching colon directly with specific delivery system like (CSDDS), results in overall improvement of the disease and reduce the antibiotic resistance¹³.

Ultrasonography quickly and safely provides detailed high resolution images of internal organs and blood vessels. It helps the physician to determine the source of abdominal pain. Ultrasound imaging is a painless noninvasive procedure and it works on the principle of reflection of high frequency sound waves. By measuring these

echo waves, it is possible to determine the object size, shape and consistency.

Effects of Ultrasound

Four physical effects of ultrasound are of principal concern:

- (1) Tissue heating resulting from frictional resistance to wave transmission;
- (2) Streaming of suspended particulate matter or cell structures;
- (3) Direct vibratory effects on membranes and other cell structures; and
- (4) Cavitations phenomena

The shifting (localization) of pain is a pointer toward diagnosis; for example, per umbilical pain of a few hours localizing to the right lower quadrant suggests appendicitis. Radiation of pain can be helpful in diagnosis; for example, in biliary colic the radiation of pain is toward the inferior angle of the right scapula, pancreatic pain radiated to the back, and the renal colic pain is radiated to the inguinal region on the same side.

Somatic pain is intense and is usually well localized. When the inflamed viscous comes in contact with the somatic organ like the parietal peritoneum or the abdominal wall, pain is localized to that site.

Peritonitis gives rise to generalized abdominal pain with rigidity, involuntary guarding, rebound tenderness, and cutaneous hyperesthesia on physical examination.

Referred pain from extra intestinal locations, due to shared central projections with the sensory pathway from the abdominal wall, can give rise to abdominal pain, as in pneumonia when the parietal pleural pain is referred to the abdomen.

The pain in a child with RAP usually has the following features:

- Pain is usually per umbilical and paroxysmal

- It may be dull or colicky, more often the latter
- Usually unrelated to food, bowel habits or any other activities
- Generally does not disturb sleep, but can interfere with activities
- Poorly localized and non-radiating.

Aims and Objectives

This prospective study has been undertaken with the following objectives:

- To study the incidence of pain abdomen and to evaluate the etiology of pain abdomen in children aged between 1 to 12 yrs.
- To study the utility of ultrasound in evaluating the etiology of pain abdomen.

Methodology

This is a prospective observational study conducted over a period of 18 months from January 2012 to June 2013, In a Tertiary care level hospital, Princess Esra hospital [PEH], Deccan college of medical sciences, Hyderabad, Andhra Pradesh, India.

Inclusion criteria

All the consecutive children aged between 1-12 years, admitted to pediatric ward in PEH as well as children attending the OPD with complaints of pain abdomen (Both acute & recurrent pain abdomen, fulfilling Apley's Criteria of 3 episodes over a period of 3 months) were included in the present study.

Exclusion criteria

- 1) Children aged < 1 yr and >12 yrs.
- 2) Children presenting to emergency department with acute surgical abdomen were excluded.

Data was collected in a pretested, predesigned Performa. A detailed history and examination including (per abdominal examination) was performed to look for

organic causes of pain abdomen. All these children were investigated and the results were recorded and tabulated. Ultrasound examination of the abdomen was performed using GE logic-500 machine with a high 3-5 MHz linear transducer in all the children to look for organic causes of pain abdomen. Baseline investigations (Hemoglobin, Stool examination for ova and cysts of parasites) were performed and data was documented. Complete Urine analysis and urine culture were done as per the clinical diagnosis. Children who had a positive urine culture were subsequently tested for antibiotic sensitivity and treated accordingly. Other investigations included serum amylase, serum lipase, liver enzymes(SGOT,SGPT, alkaline phosphatase), X ray abdomen erect view(to look for calcifications, renal and gall stones), IVP, Upper GI endoscopy was performed as per requirement upper GI pathology was suspected after obtaining written informed consent. Esophagus, stomach and the duodenum were evaluated using an end view as well as side view flexible pediatric endoscope.

A total number of 100 cases were collected from the in-patient and the out-patient department of Pediatrics, PEH. Males and females were equally distributed among the study populations as shown in figure 1. Similarly, gender distribution was equal among the children with acute and recurrent pain abdomen. Children were arbitrarily divided into three age groups between 1-5 yrs, between 6-10 yrs and between 11-12 yrs.

The majority of the children were aged between 6-10yrs (55%) followed by 11-12yrs (as shown in figure no 2). Fever and vomiting were the predominant associated symptoms (38% and 37% respectively) (as shown in figure no 3).

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and vomiting were the predominant associated symptoms (38% and 37% respectively) (as shown in figure no 3).

Umbilical tenderness was the frequently manifested clinical sign(37%) closely followed by epigastric tenderness(27%) and right iliac fosse (RIF) tenderness (13%) (as shown in figure no 4).

Other than Ultrasonography investigations of positive investigations of clinical attributes showed abnormal findings in 80% of the children and there were no significant findings in the rest (20%) of the study population. (As shown in figure no 5).

Mesenteric lymphadenitis was the commonest finding in USG (31.6%), followed by the other findings such as enterogenous cyst (18.3%), increased kidney echo texture(9%), bladder calculi, pleural effusion, pyloric stenosis, wilmstumor, liver abscesses (as shown in figure no 6). Acute appendicitis was present in 11.6% of children.

Acute appendicitis was found in 21.8% of the children and was the most predominant cause of acute pain abdomen, followed by other causes (Intussusceptions, Dengue fever, Pyloric stenosis, Amoebic liver abscess, Lactose intolerance, Renal calculi, Pneumonia) (as shown in figure no 7).However pancreatitis was also seen in 9.3% of children.

Esophago-gastro-duodinitis was seen in 36.8% of the children with recurrent abdominal pain followed by worm infestation (23.1%). Functional etiology was seen in insignificant proportion of children (4.2%) (as shown in figure no 8

Worm infestation was seen in 23 % of the children out of which 37.5% had enlarged mesenteric lymphadenitis. Chi-square test did not reveal significant association between mesenteric lymphadenitis and worm infestation (p value: 0.5).

Discussion

Abdominal pain in children is the most common clinical manifestation with variable underlying pathology which ranges from insignificant functional causes to potentially fatal events.¹

When the clinical presentations of this study were compared to that of the Robert T Stone *et al*⁸, it was found that the presentation of Anemia was similar in both the studies. However, a huge difference was found in the presentation of fever in both the studies. This study showed about 38% of cases with fever where as only 15.6% were shown in the study of Robert T Stone *et al*⁸. The cases with clinical presentation of constipation, diarrhea and weight loss were higher in our study when compared to that of Robert T Stone's study⁸. Upper GI endoscopy was normal in 78% of the study population while gastritis was seen in 15% of the children with pain abdomen and rest of the patients has normal profile. Study by A K Patwari *et al*⁹ showed that 41.7% of the children had gastritis. One child had duodenitis in our study where as no case of duodenitis was reported by Patwari *et al*⁹.

When the organic causes of RAP were compared, it was found that our study had about 15% of the organic causes due to gastritis, whereas the study of A K Patwari had about 27%⁹.

Cystitis was seen in 4 children, but the incidence of cystitis was higher (15%) in Patwari *et al*'s study⁹. Worm infestation and esophagitis were almost similar in both the studies.

The USG findings in the present study were similar to the study by simonovsky *et al* in diagnosing acute appendicitis¹⁰. USG was helpful in diagnosing normal appendix, mesenteric lymph nodes, and intussusceptions which was comparable to in simonovsky *et al*¹⁰. In the present study positive USG findings were seen in 60% of the cases, which

strengthens the utility of ultrasound as a screening tool.

The majority of the children presenting with RAP (96%) had organic etiology when compared to Patwari *et al*⁹, who reported organic causes in 88.6% of cases with RAP. H.pylori was detected in 6% of children with pain abdomen which was comparable to other studies.

Conclusion

1. This study showed that majority of the children with pain abdomen had organic etiology (96%) which is far more common than functional cause (4%). Hence there is an urgent need to screen all the children with pain abdomen for organic causes and not to overlook as functional causes.
2. Appendicitis is an important cause of pain abdomen and can be detected by ultrasonography.
3. The presence of mesenteric lymph nodes <5mm is a nonspecific finding in children without pain abdomen.
4. Increased echogenicity of the renal cortex in children with acute illness is a transient finding, not associated with renal disease.
5. Ileo-Ileal and Ileo-Colic intussusceptions can be differentiated using USG.
6. Mesenteric lymphadenitis is an important cause of RAP in children. State the causes of mesenteric lymphadenitis...TB/Enteric fever/

Organic abnormalities were found in 60% of patients with the help of USG.

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References

1. Approach To Pediatric Abdominal Pain, learnpediatrics.com/body systems/ gastro-intestinal/approach-to-pediatric-abdominal-pain/ last accessed on 13/3/2014
2. Maria Antonietta Mazzei *et al*, The role of US examination in the management of acute abdomen. *Critical Ultrasound Journal* 2013, 5(Suppl 1):S6 doi:10.1186/2036-7902-5-S1-S6.
3. Maureen McCollough *et al*, Abdominal Pain in Children. *PediatrClin N Am* 53 (2006) 107– 137.
4. S Scammell, N Lansdale, ASprigg, D Campbell, S Marven. Ultrasonography aids decision-making in children with abdominal pain. *Ann R CollSurgEngl*2011; 93: 405–409 doi:10.1308/003588411X582672
5. Ultrasonographic features in children presenting with abdominal pain: normal versus abnormal by Prof. Dr. J.L. Bloem, 2009, F. Wiersma, The Netherlands, pg 1-79. ISBN: 978-94-90122-41-6.
6. Mohd. Khalid, NavneetRedhu, Babar Nazir, Saifullah Khalid, R. S. Chana, AbhishekJha, Diagnostic value of ultrasonography in evaluation and management of acute abdominal conditions in the paediatric age group. *African Journal of Paediatric Surgery*, September-December 2012 / Vol 9 / Issue 3. DOI:10.4103/0189-6725.104719
7. Niranga ManjuriDevanarayana, Shaman Rajindrajith, H Janaka De Silva. Recurrent Abdominal Pain In Children. *INDIAN PEDIATRICS*, VOLUME 46_MAY 17, 2009. Pg No 389-399.
8. Robert T.Stone, Giulio J. Barbero. Recurrent Abdominal pain in children. *Pediatrics*. 1970 May; 45(5): 732-738
9. Banal D, Patwari AK., Mathura V.L, Amphora V and VK. Helicobacter pylori infection in recurrent abdominal pain. *Indian Pediatrics* 1998; 35:329-335.
10. Simonovsky V. Normal appendix: Is there any significant difference in the maximal mural thickness at US between pediatric and adult populations? *Radiology* 2002; 224:333-337
11. Shiva Kumar Yellanki, Jawad Ali Syed, Sharada Goranti, Hydrodynamically Balanced Bilayer Tablets Of Glycerol Monooleate Coated Amoxicillin Trihydrate: A Novel Approach To Prolong The Local Action By Gastric Retention. *IntRJPharmSci*.2010; 01(01); 0038-0041
12. Safila Naveed*, Asra Hameed, Ammarah Urooj And Ramsha Mehak,Awareness About Irritable Bowel Syndrome(IBS). A Survey Based Study, *AJPP*[1][3][2014] 069-075.
13. S. Jeganath and K. Senthilkumaran, Formulation and *In vitro* Evaluation of Colon Specific Drug Delivery of Budesonide, *AJPP*[1][3][2014] 156-165.

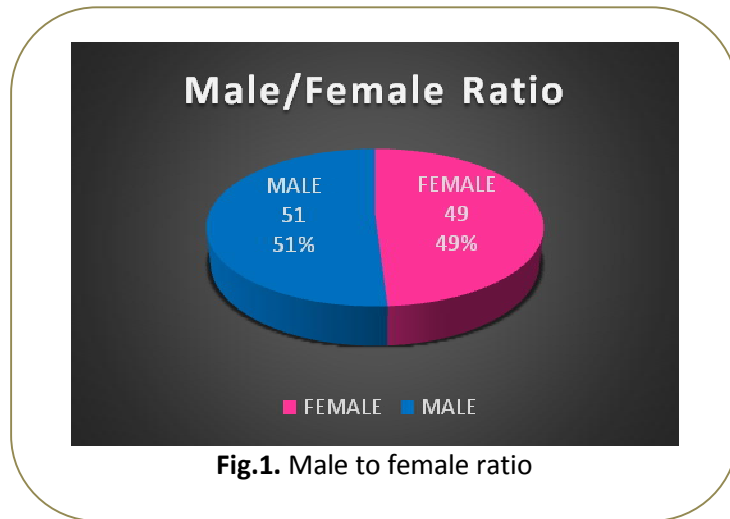


Fig.1. Male to female ratio

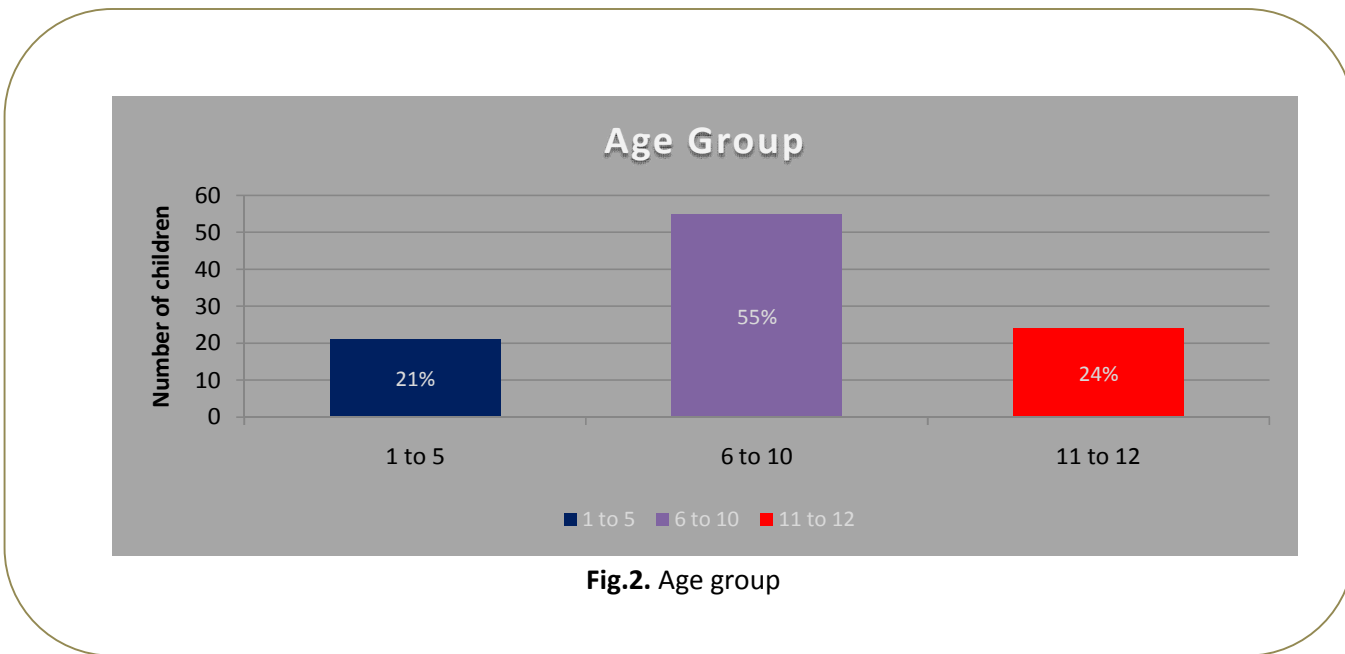


Fig.2. Age group

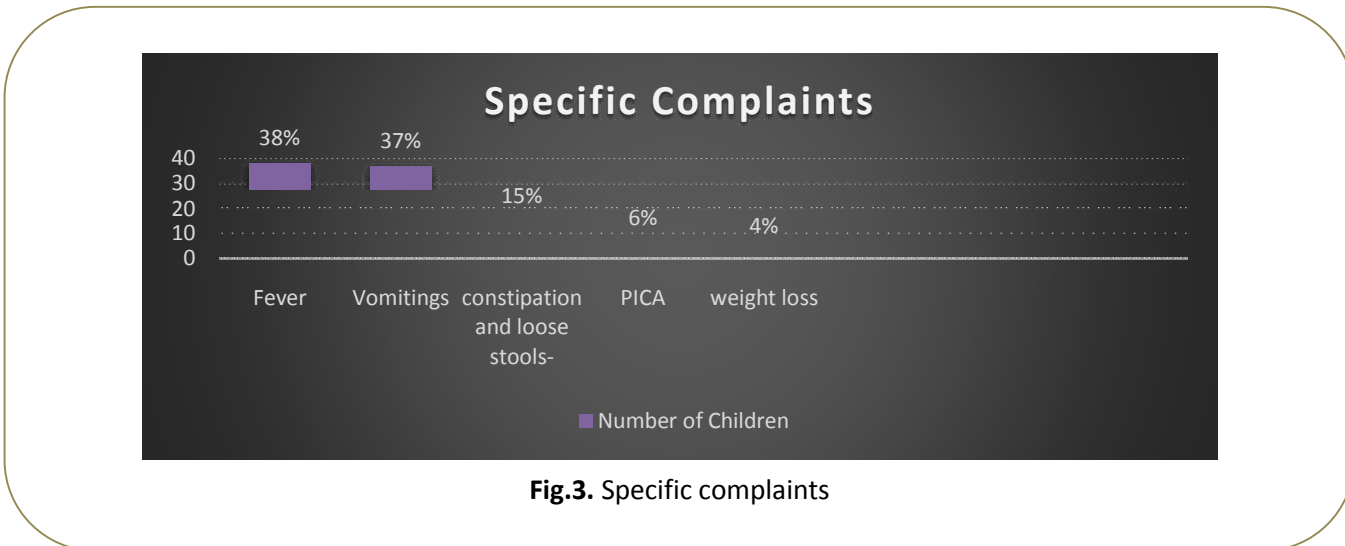


Fig.3. Specific complaints

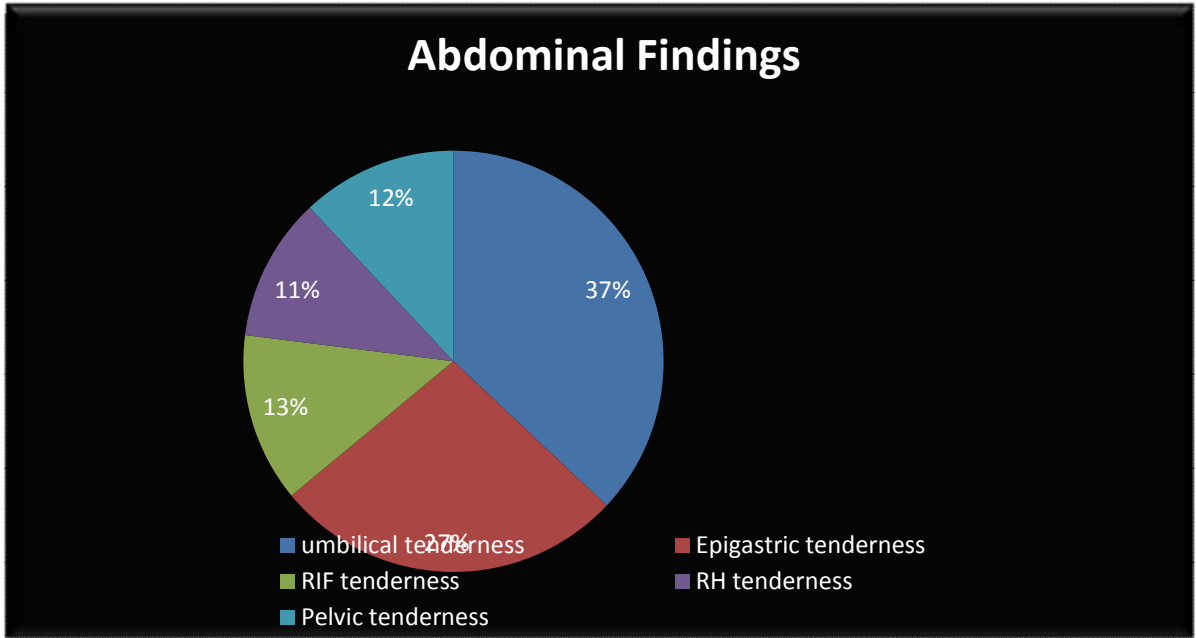


Fig.4. Abdominal findings

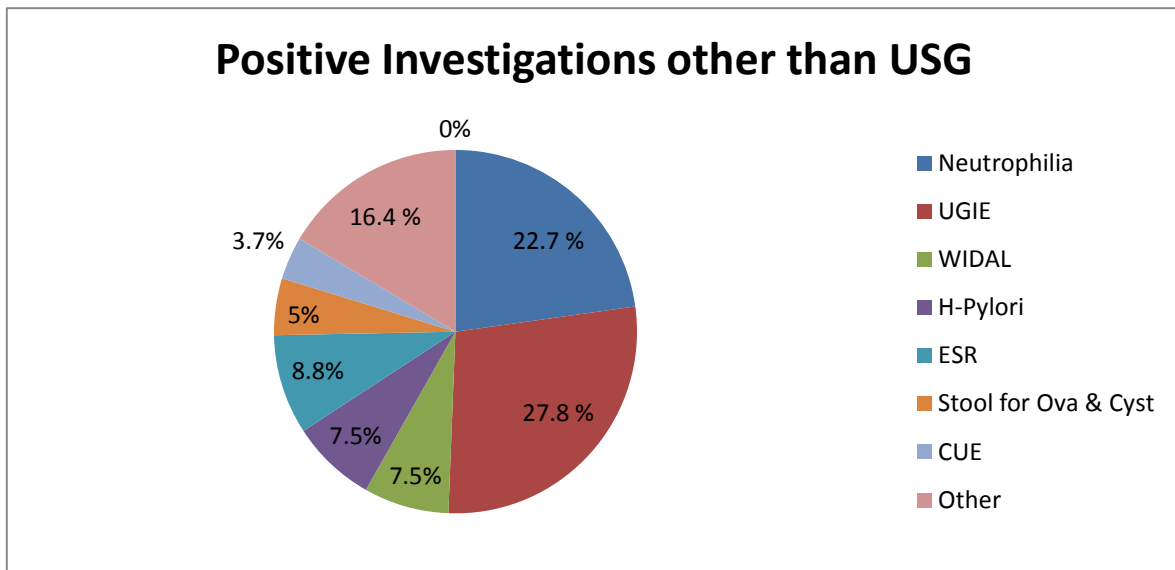


Fig.5. Positive investigations other than USG

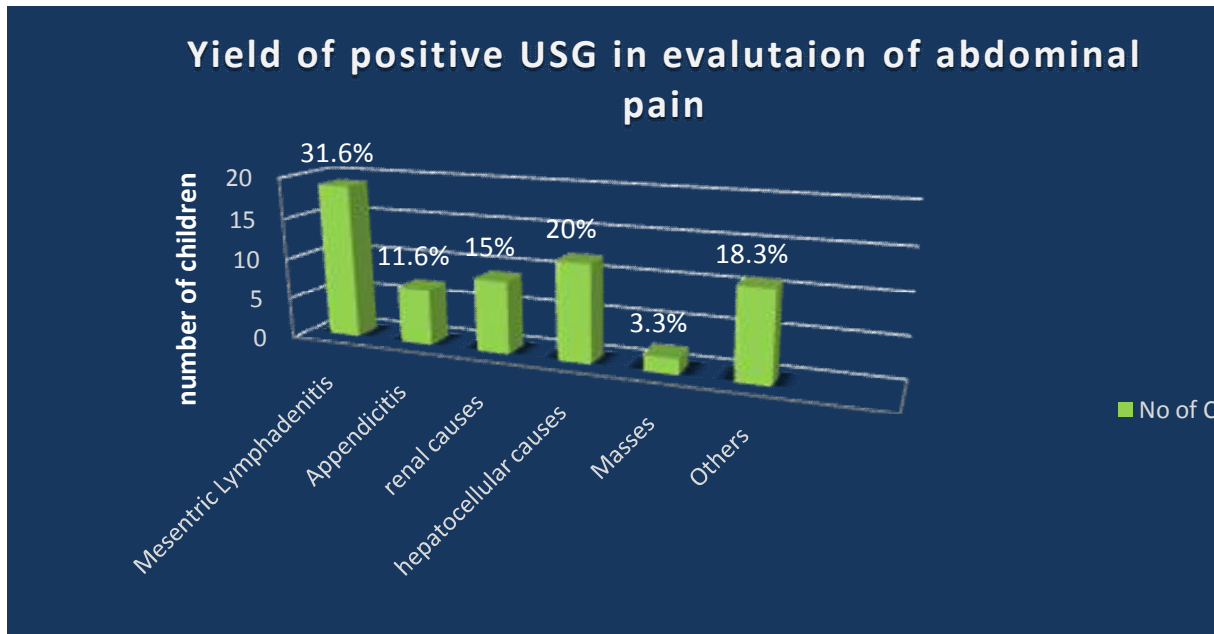


Fig.6. Positive USG in Evaluation abdominal pain

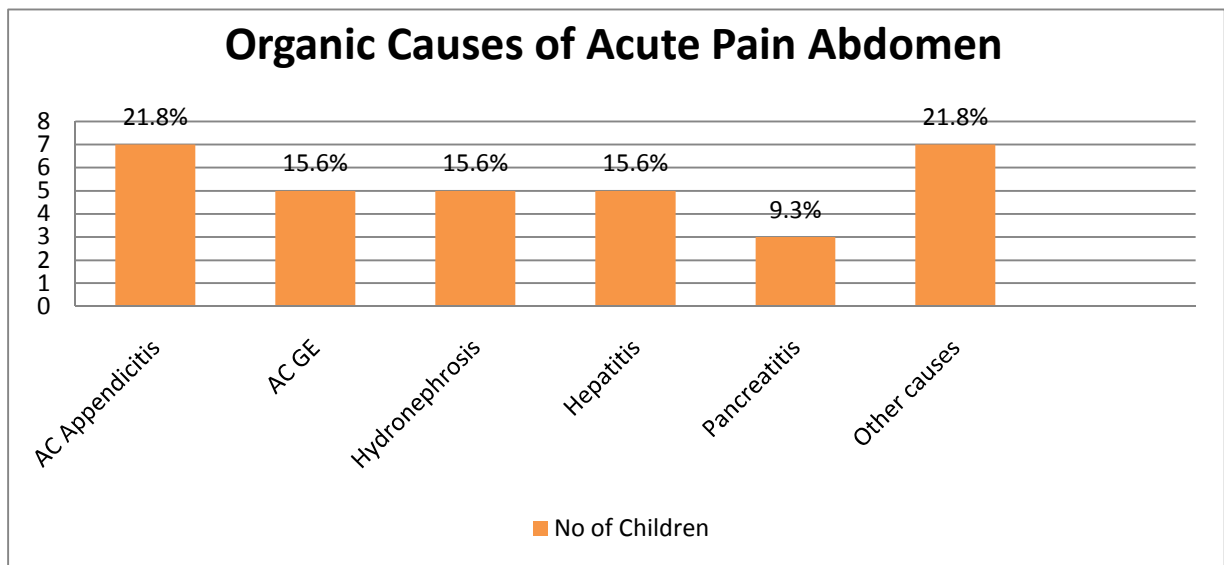


Fig.7. Organic causes of acute pain abdomen

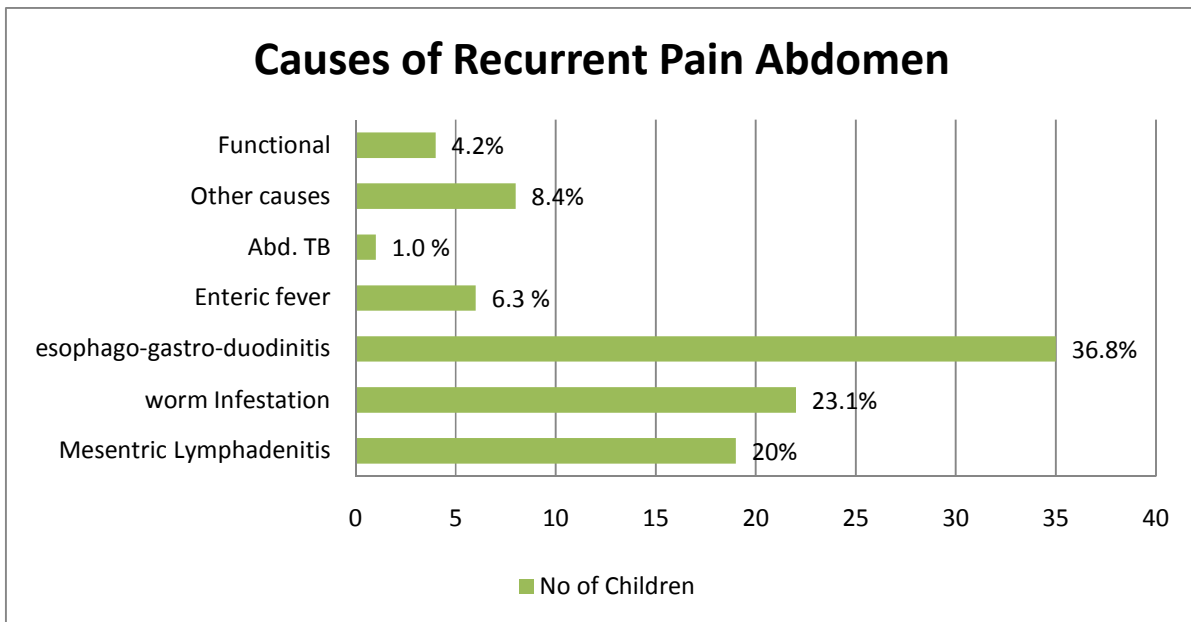


Fig.8. Causes of recurrent pain abdomen

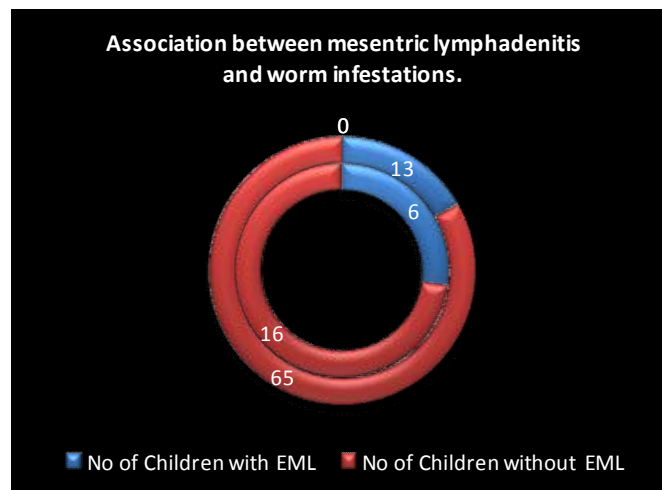


Fig.9. Association between mesenteric lymphadenitis and worm infestation