

# ORIGINAL ARTICLE

## To investigate the use of ultrasound in assessing children with acute abdominal conditions

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### ABSTRACT:

**Aim:** To investigate the use of ultrasound in assessing children with acute abdominal conditions. **Material and Methods:** A total of 100 pediatric patients, aged below 14 years, who presented with acute abdominal discomfort in either the emergency department or pediatric outpatient department, had initial evaluation by clinical examination followed by ultrasound and X-ray. Children were chosen based on rigorous inclusion criteria. The research only included children who had sudden stomach discomfort and did not have a previous history of comparable symptoms. **Results:** Abdominal distention (59%), fever (56%) and vomiting (55%) was the most common associated symptoms with acute abdomen. Guarding and rigidity was present in 55% cases. The intestinal obstruction was most common cause (45%) of acute abdomen. Renal colic, pancreatitis and HSP were uncommon (1% each) cause. Appendicitis is present in 15% cases. Mesenteric lymphadenopathy is rare (only 4%) cause but in 25% cases causes were un-identified. The diagnostic accuracy of clinical evaluation is much higher (86.67% Vs 68.89%) as compare to USG evaluation, if both steps performed individually. But accuracy gradually increased (95.56%), if clinical evaluation and USG done simultaneously. If radiography also added in evaluation, diagnostic accuracy increased to 100%. In 25 (25%) cases etiological cause not established. Intestinal obstruction is the most common pathology in 45(45%) cases, appendicitis in 15 (15%) and intra-abdominal abscess in 08 (8%) cases. **Conclusion:** Ultrasonography plays a crucial function in examining a youngster with an acute abdomen. It should be regarded as the primary imaging technique. The findings of this research validate that ultrasonography is a generally precise, dependable, and expeditious screening technique for assessing the causes of acute abdomen, particularly those requiring surgery, in children.

**Keywords:** Ultrasound, Children, Acute abdominal conditions

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### INTRODUCTION

Acute abdomen can be defined as "A syndrome induced by wide variety of pathological conditions that require emergent medical or more often surgical management". Recurrent Abdominal pain is most common cause of routine OPD visit as well as emergency visit in pediatric age. Similar Acute abdominal pain is also a common clinical problem among children visiting the emergency department. Most of the times these are non-surgical problems but wide range of surgical conditions are not rare. Acute appendicitis is most common surgical condition. Although by proper history and through clinical examination, diagnosis can be made in most of the cases but sonography has proven to be a reliable technique for establishing the diagnosis of acute abdomen [1,2,3]. Historically, computed tomography (CT) Scan has been the first choice of imaging in acute abdominal pain, with sensitivity of up to 96% and specificity of up to 97% (4,5). However, because of the radiation injuries, high establishment cost, lack of expertise in interpretation of findings in small cities especially in developing countries and diagnostic accuracy of emergency ultrasonography similar to CT

Scan, ultrasonography become first choice in evaluation in suspected pediatric acute abdomen [6,7,8]. In this study we have evaluated the diagnostic accuracy of ultrasonography in helping to make diagnosis in children presented with acute abdomen.

### MATERIAL AND METHODS

A total of 100 pediatric patients, aged below 14 years, who presented with acute abdominal discomfort in either the emergency department or pediatric outpatient department, had initial evaluation by clinical examination followed by ultrasound and X-ray.

Children were chosen based on rigorous inclusion criteria. The research only included children who had sudden stomach discomfort and did not have a previous history of comparable symptoms.

### RESULTS

Table No: 01 depicts that abdominal distention (59%), fever (56%) and vomiting (55%) was the most common associated symptoms with acute abdomen. Guarding and rigidity was present in

55% cases. Table No-02 depicts that intestinal obstruction was most common cause (45%) of acute abdomen. Renal colic, pancreatitis and HSP were uncommon (1% each) cause. Appendicitis is present in 15% cases. Mesenteric lymphadenopathy is rare (only 4%) cause but in 25% cases causes were un-identified.

Table No-03 depicts that diagnostic accuracy of clinical evaluation is much higher (86.67% Vs 68.89%) as compare to USG evaluation, if both

steps performed individually. But accuracy gradually increased (95.56%), if clinical evaluation and USG done simultaneously. If radiography also added in evaluation, diagnostic accuracy increased to 100%. In 25 (25%) cases etiological cause not established. Intestinal obstruction is the most common pathology in 45(45%) cases, appendicitis in 15 (15%) and intra-abdominal abscess in 08 (8%) cases.

**Table-1: Clinical symptoms of patient**

Symptoms	Number	Percentage (%)
Acute Abdomen	100	100
Vomiting	55	55
Fever	56	56
Abdominal Distention	59	59
Guarding/Rigidity	55	55

**Table-2: Final Diagnosis of Acute Abdomen**

Disease	Number of Patients	Percentage (%)
Intestinal Obstruction	45	45
Abscess	8	8
Appendicitis	15	15
Mesenteric lymphadenopathy	4	4
Renal Colic	1	1
Pancreatitis	1	1
HPS	1	1
Unknown	25	25

**Table-3: Results of 4 steps Diagnosis**

Diagnosis	Clinical Evaluation	UGG Evaluation	Clinical Evaluation + USG	Clinical Evaluation + USG + Radiography	Final Diagnosis
Intestinal Obstruction	39	31	43	45	45
Abcesses	8	6	8	8	8
Appendicitis	11	9	13	15	15
Mesenteric lymphadenitis	3	2	4	4	4
Renal colic	1	1	1	1	1
Pancreatitis	1	1	1	1	1
Hypertrophic pyloric Stenosis	1	1	1	1	1
Unknown	11	7	10	25	25
Correct diagnosis	75	58	81	100	100

## DISCUSSION

Sonography is widely available, can be performed at the bedside easily, required less preparation and less intervention time, there is no risk of radiation, relatively inexpensive, and may show evidence of other causes of abdominal pain. It is particularly useful in evaluating young women and pregnant women, in whom the radiation dose to the reproductive organs should be minimized. Acute abdomen is some of common emergencies where diagnosis should be made with most accuracy, because definitive management depends on accurate diagnosis. Diagnostic accuracy is increased if ultrasonography and radiography are added over clinical evaluation. There are wide range of etiological causes which can cause acute

abdomen, some of non-serious and some of serious need immediate attention. In most of places conventional radiograph (X-Ray) of abdomen are used as a first diagnostic modality in acute abdomen [9]. But diagnostic accuracy is less and most of the time unable to reach some conclusion. Because of the diagnostic limitation plain film of abdomen, Ultrasonography provide more and sometimes entirely different information about abdominal pathology. Laparoscopy and Computed Tomography (CT), are reserved as second-line investigation methods due to the risk of surgical invasiveness in laparoscopy, and radiation exposure in CT. Diagnostic accuracy CT Scan is better than ultrasonography but emergency ultrasonography has shown almost similar results in the diagnostic

work-up of children presenting with acute abdomen. In our study diagnostic accuracy of sonography alone was found 65%. Mendelson et al and Walsh et al in their respective studies found ultrasonography to be 50% diagnostic to identify the cause of acute abdomen in children [10,11]. Diagnostic accuracy in adult is less as compared to children. Studies in adult population found diagnostic accuracy of ultrasonography is around 25-34.7% [12,13]. This higher diagnostic efficacy in pediatric patients is attributed to their thinner abdominal wall and use of higher frequency probes. In 25% cases cause remains unknown despite taking help of ultrasonography and radiology. Nothing can replace the clinical acumen of the pediatrician, 86.67% cases accurate diagnosis was made only with clinical examination.

Ultrasonography should be used as an adjunct to the clinical evaluation. Except in few cases, ultrasonography gradually replacing plain abdominal radiographs in making etiological diagnosis. Ultrasonography helps in making faster diagnosis and earlier institution of necessary medical or surgical intervention. USG can be used as a initial imaging modality in case of non-traumatic acute abdomen. It is as good as laparoscopy in diagnosing acute abdominal pathologies. It is ideally suited for children not only because of its non-invasive nature and cost-effectiveness but also because it doesn't expose the children to radiation.

## CONCLUSION

Ultrasonography plays a crucial function in examining a youngster with an acute abdomen. It should be regarded as the primary imaging technique. The findings of this research validate that ultrasonography is a generally precise, dependable, and expeditious screening technique for assessing the causes of acute abdomen, particularly those requiring surgery, in children. Ultrasonography is a very convenient and cost-effective method for examining children. It may be performed at the bedside and, most importantly, it does not pose any risk of radiation exposure.

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