

**CORRELATION OF SERUM BILIRUBIN WITH SEVERITY OF ACUTE  
APPENDICITIS- A PROSPECTIVE STUDY**

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**Abstract**

**Background:** Acute appendicitis is one of the most commonly abdominal emergencies in surgery. Several scoring systems developed on the basis of clinical history and physical examination and ultrasound imaging to arrive at a diagnosis but still acute appendicitis or appendicular perforation cannot be predicted by any specific

markers. This study was to establish correlation between raise of serum bilirubin and severity of appendicitis and its specificity in diagnosing it.

**Materials & Methods:** This was a prospective observational study carried out in the Department of General Surgery, Kalinga Institute of Medical Sciences. Total 90 patients were selected for the study with thorough clinical assessment, laboratory investigations, ultrasound findings. After confirming the diagnosis of Acute Appendicitis, the patients had undergone operative intervention. In all patient's liver function, serum bilirubin along with liver enzyme assay was done and the findings were correlated with severity of appendicitis and its complications.

**Results:** Out of total 90 patients 58 were male and 32 were female with mean age of the patients participated is 32.34 years. Mean total serum bilirubin of the patients with diagnosis of acute appendicitis is 0.61mg/dl with a standard deviation of 0.34 and those with diagnosis of Appendicular perforation is 1.41 mg/dl with a standard deviation of 0.90. Mean SGOT and SGPT have mildly raised with perforated appendicitis.

**Conclusion:** Study conducted suggested that there is a significant raise of serum bilirubin levels in the cases of severe acute appendicitis. Along with clinical and radio imaging, study of serum bilirubin levels pre-operatively will be an effective indicator in cases of acute appendicitis in grading the severity of appendicitis

**Keywords:** Acute appendicitis, perforated appendicitis, serum bilirubin

## Introduction

Acute appendicitis is one of the most commonly abdominal emergencies in surgery, and appendectomy is the most frequently performed emergency operation.<sup>1,2</sup>

Appendicitis is diagnosed on the basis of clinical history and physical examination but it poses difficulty in diagnosing in cases of retrocecal or retroileal appendicular pathology. Ultrasound abdomen is the widely accepted diagnostic tool for appendicitis.<sup>3-6</sup> Several scoring systems developed to arrive at a diagnosis based on clinical features and laboratory investigations like TLC and serum CRP<sup>7-9</sup>. The commonly adopted scoring systems are Alvarado<sup>10</sup>, modified Alvarado<sup>11</sup> and Ripasa scoring system.

Acute appendicitis or appendicular perforation cannot be predicted by any specific markers. However, some studies show a correlation between a raised serum bilirubin level with cases of severe acute appendicitis, appendicular gangrene or appendicular

perforation.<sup>12</sup> With the infiltration of bacteria into appendix, these bacteria transmigrate and cause release of cytokines like TNF-  $\alpha$  and interleukin 6.

These cytokines lead to inflammation, abscess and hepatic dysfunction passing through superior mesenteric vein and reaching liver.<sup>13-19</sup>

Based on this pathophysiology changes this study is done to establish correlation between raise of serum bilirubin and severity of appendicitis and its specificity in diagnosing it.

Aim of this study is to know the clinical significance of preoperative hyperbilirubinemia in the patients with acute appendicitis. To study and strengthen the correlation between level of serum bilirubin and severity of acute appendicitis.

### **Materials & Methods**

This is a prospective observational study done in the Department of General Surgery, Kalinga Institute of Medical Sciences in the time frame of November 2020 to September 2022. As per the inclusion criteria all the cases admitted with diagnosis of acute appendicitis included in this study. Patients having habituation of chronic alcoholism, hemolytic disease and congenital or acquired biliary disease are excluded from the study.

After taking proper informed consent of the patient detail history and clinical examination was done. Routine blood investigations like CBC, RBS, blood urea and serum creatinine, serum electrolyte, viral marker (HIV, HBsAg & HCV) and ultrasound of abdomen and pelvis were conducted. In all patients Liver Function Test - Serum Bilirubin (Total Bilirubin & Direct bilirubin), SGPT (Alanine transaminase), SGOT (Aspartate transaminase), ALP (Alkaline phosphatase), GGT (Gamma Glutamyl Transferase) was done.

Statistical analysis was done by IBM ® SPSS ® 23.0 S. Continuous variables are presented as mean  $\pm$  SD, and categorical variables are presented as absolute numbers and percentage.

### **Results**

Total 90 Patients were diagnosed as Acute appendicitis undergone for surgery procedure included in this study and the mean age was 32.54 years. The maximum age in the study was 75 years along with the minimum age was 5 years. As per gender distribution, total percentage of male participation was 64.4% while female participation was 35.6%.

**TABLE- 1 Correlation of Liver Function Test with appendicitis.**

		<b>Appendicular perforation</b>	<b>Acute appendicitis</b>	<b>Total</b>	<b>P-value</b>
<b>Total bilirubin</b>	N	31	59	90	0.001
	Mean	1.41	0.61		
	SD	0.9	0.34		
<b>Direct bilirubin</b>	N	31	59	90	0.013
	Mean	0.34	0.18		
	SD	0.32	0.17		
<b>Indirect bilirubin</b>	N	31	59	90	0.001
	Mean	1.04	0.43		
	SD	0.68	0.26		
<b>SGPT</b>	N	31	59	90	0.109
	Mean	29.91	32.62		
	SD	25.98	15.60		
<b>SGOT</b>	N	31	59	90	0.056
	Mean	36.86	40.19		
	SD	33.76	24.87		

There is a raise of mean total serum bilirubin levels (two and half times) in cases of appendicular perforation compared to acute appendicitis. Two times increase of mean serum direct bilirubin and three times increase of mean serum indirect bilirubin levels in cases of appendicular perforation compared to those cases without appendicular perforation. Mean SGPT levels in cases in acute appendicitis cases are slightly increased compared to cases of appendicular perforation. There is slight increase of SGOT levels in cases of acute appendicitis without perforation than those cases with appendicular perforation.

### **Discussion**

Study was done on a total of 90 patients, out of which 58 were male and 32 were female. out of the patients participated minimum age of the patient is 5 years and maximum are 70 years and mean age of the patients participated is 32.34 years.

Mean total serum bilirubin of the patients with diagnosis of acute appendicitis is 0.61mg/dl with a standard deviation of 0.34 and those with diagnosis of appendicular perforation is 1.41 mg/dl with a standard deviation of 0.90. there is a total raise of more than 2 times of serum bilirubin in cases of appendicular perforation when compared to that of acute appendicitis without perforation.

A significant raise of total serum bilirubin is more or less consistently observed in cases of appendicular perforation ( $P < 0.001$ ).

Mean direct bilirubin of the patients in cases of acute appendicitis is 0.18 mg/dl with a standard deviation of 0.17 and those with a diagnosis of appendicular perforation is 0.34 mg/dl with a standard deviation of 0.32.the study deserves almost a raise of 2 times in the serum bilirubin levels in cases of appendicular perforation when compared to that of acute appendicitis cases without perforation. there is a significant raise observed, which is considered significant ( $P= 0.013$ ).

Mean indirect bilirubin of the patients in case of acute appendicitis is 0.43 mg/dl with a standard deviation of 0.26 and those with a diagnosis of appendicular perforation is 1.04 mg/dl with a standard deviation of 0.68. There is one and half times raise of serum indirect bilirubin in cases of appendicular perforation as compared to that of cases with diagnosis of acute appendicitis without perforation ( $P<0.001$ ).

Mean SGOT of patients in case of acute appendicitis is 36.86 U/L with a standard deviation of 33.76 and those with a diagnosis of Appendicular perforation is 40.19 u/l with standard deviation of 24.87. This suggests that serum SGOT is also mildly raised in cases of acute appendicitis with perforation compared to cases of acute appendicitis without perforation ( $P= 0.056$ ).

Mean SGPT of patients in cases of acute appendicitis is 29.91 U/L with standard deviation of 25.98 and in cases of appendicular perforation is 32.62 U/L with a standard deviation of 15.60. SGPT also shows a slightly higher serum level in cases of appendicular perforation ( $P=0.109$ ).

Our study shows that isolated hyperbilirubinemia without much elevation in the liver enzymes (SGOT, SGPT) is a significant predictor of appendiceal perforation. This was demonstrated by a study by Estrada et al<sup>20</sup> and other studies<sup>21,22</sup> showing nearly a threefold risk of perforated appendicitis in patients with total bilirubin levels greater than 1 mg/dL.

## Conclusion

Study conducted suggests that there is a significant raise of serum bilirubin levels in the cases of severe acute appendicitis. Hence it can be a useful indicator of severity in cases of severe acute appendicitis to predict gangrenous appendicitis and appendicular perforation. So, it is essential to maintain High level of suspicion of appendicular perforation in cases which has high levels of serum bilirubin levels pre operatively and appropriate steps should be taken in the management of the patient including the preoperative informed consent and counseling.

Estimation of Serum bilirubin is a simple, cheap and easily available test in all laboratory, can be added to the routine investigation. Along with clinical and radiological i.e., ultrasound and contrast enhanced CT of abdomen and pelvis serum bilirubin levels, pre operatively will be an effective indicator in cases of acute appendicitis in grading the severity of appendicitis and act as an important aid in the management plan.

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