



**ORIGINAL RESEARCH PAPER**

**General Surgery**

**PROSPECTIVE STUDY OF C-REACTIVE PROTIEN LEVEL IN DIAGNOSIS OF ACUTE APPENDICITIS**

**KEY WORDS:** C-reactive protein, Appendix, Appendectomy

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**ABSTRACT**

**Background-** Acute abdominal pain is a common complaint among emergency department patients. Diagnosis of one of the most common pathologies behind acute abdominal pain, acute appendicitis, has radically changed over the last decades.

**Methods-** The source of data was from pretested proforma which takes into account clinical history, general physical examination, relevant investigations, imaging modalities.

**Results-** In our study CRP test sensitivity was 92.00%, specificity was 84.00 %, positive predictive value was 96.00%, negative predictive value was 66.00% and diagnostic accuracy was 92.00%.

**Conclusion-** raised serum C-reactive protein reducing the rate of negative explorations.

**INTRODUCTION**

Acute abdominal pain is a common complaint among emergency department patients. Diagnosis of one of the most common pathologies behind acute abdominal pain, acute appendicitis, has radically changed over the last decades. Traditionally, the diagnosis of appendicitis was made solely based on clinical symptoms and signs, and later diagnosis included results of inflammatory laboratory variables such as leukocytes, neutrophils, and CRP. This practice in diagnosis led to a false positive diagnosis (negative appendectomy) rates in the range of 15-30%<sup>1-3</sup>.

The vermiform appendix is present only in humans, certain anthropoid apes and the wombat. It is a blind muscular tube with mucosal, submucosal and serosal layers. The appendix varies considerably in length and circumference. The average length is between 7.5 and 10cm and diameter generally does not exceed 6mm maximal outer diameter. The appendicular artery, a branch of ileocolic artery, passes behind the terminal ileum to enter the mesoappendix and supply the appendix. Four to six or more lymphatic channels traverse the mesoappendix to empty into the ileocaecal lymph nodes.

In this study we correlate the quantitative serum levels of CRP with the diameter of appendix in acute appendicitis. This study emphasizes the impact of normal rather than raised serum C-reactive protein in reducing the rate of negative explorations.

**MATERIALS AND METHODS**

**Source Data**

The source of data was from pretested proforma which takes into account clinical history, general physical examination, relevant investigations, imaging modalities.

They were included after explaining them about the study and taking their written consent.

**Inclusion Criterion**

The inclusion criteria are following:

1. Patients in the age group 12 to 50Yrs.

**Exclusion Criterion**

The exclusion criteria are following:

1. Children below 12 years and elderly above 50 years was excluded as the CRP response is not optimal.

2. Patients who were managed conservatively or Individuals who had undergone appendectomy for pain abdomen was

excluded from this study.

3. Patients with past history of jaundice, signs and symptoms of liver disease, chronic alcoholic and with other coexisting acute inflammatory conditions were excluded, as CRP is exclusively produced in liver and raised in acute inflammatory condition.

4. Females taking oral contraceptive pills or pregnant were excluded as CRP is elevated in these individuals.

5. Patients with appendicular lumb / appendicular abscess were exclude.

6. Patients, not willing to participate in the study (who refused to give consent).

**Measurement Of Serum CRP Level :**

Quantitative assessment of serum CRP was done using human CRP kit based on the principle of solid -phase enzyme-linked immunosorbent assay.

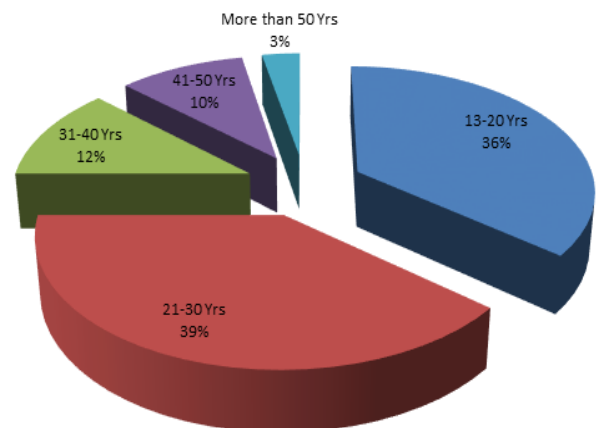
**Ultrasonography:**

Diameter of appendix in acute appendicitis was measured by ultrasonography and was correlated with CRP levels .

**Statistical Analysis :**

Datas were analysed in terms of demographic , clinical features, blood tests -white blood cells, serum CRP levels and diameter of appendix in acute appendicitis as per ultrasonography reports preoperatively.

**OBSERVATIONS & RESULTS**



**Table 1. CRP level**

CRP level	
Mean	3.61
SD	2.28

Mean CRP level was 3.61±2.28mg/dl/

**Table 2. Diagnostic Accuracy Of CRP Level**

Sensitivity	92.00%
Specificity	84.00%
Positive predictive value	96.00%
Negative predictive value	66.00%
Diagnostic accuracy	92.00%

In our study CRP test sensitivity was 92.00%, specificity was 84.00 %, positive predictive value was 96.00%, negative predictive value was 66.00% and diagnostic accuracy was 92.00%.

**Table 3. negative Appendectomy**

Appendectomy	No. of patients	Percentage
Negative appendectomy	14	14.00

In our study out of 100 cases, 14.00% negative appendectomy was occurred.

**DISCUSSION**

Non-traumatic acute abdominal or flank pain is the common reason for emergency department (ED) visits and accounts for approximately 5% - 10% of all ED visits <sup>4</sup>. Nowadays, WBC and CRP are the most frequently used supportive diagnostic markers. These markers are easily accessible, cost-effective, and routinely analysed parameters in most of the centers. Still, they have limited specificity and sensitivity. Diagnostic sensitivity and specificity of WBC are 85% and 25%, respectively <sup>5</sup>. Lower specificity of WBC values remains a serious problem. In AA, many markers of inflammation including phospholipase A2, serum amyloid A, interleukins, and cytokines have been investigated <sup>6,7</sup> Procalcitonin and D-dimer have been investigated for diagnostic purposes, and the authors indicated their lower diagnostic sensitivity and specificity <sup>8,9</sup> Bilirubin has been also investigated, and in one study it has been asserted that bilirubin could not specify AA and its complications. While in another study, higher bilirubin levels were found in PA when compared with AA patients <sup>10</sup> Although, higher CRP levels were found to be significantly higher in AA(acute appendicitis) patients relative to PA patients, it has a limited diagnostic value for AA (p < 0.0001) <sup>11,12</sup>

Emergency appendectomy was done on patients with acute appendicitis based on clinical impression of the surgeon. After the study it is noted that negative appendectomy rate was 14%. This rate of negative appendectomy was compared with other studies.

Khan MN et al, 2004 <sup>13</sup>	14.3%
Vinoth Kumar et al, 2011 <sup>14</sup>	10.00%
Shozoyokoyama et al, 2007 <sup>15</sup>	8.00%
Asfar et al, 2000 <sup>16</sup>	19.2%
Our study	14.00%

**CONCLUSION**

Raised serum C-reactive protein and appendix diameter reducing the rate of negative explorations.

**REFERENCES**

- Hoffmann J, Rasmussen O. Aids in the diagnosis of acute appendicitis. *Br J surg* 1989;76:774-779
- John H, Neff U, Kelemen M. Appendicitis diagnosis today: clinical and ultrasonic deductions. *World J surg* 1993; 17:243-249
- Jones PF. Suspected acute appendicitis: trends in management over 30 years. *Br J surg* 2001;88:1570-1577.
- Gülen B, Oktay C, Akpınar G, Sönmez E. The Utility of a Standardized Evaluation Form for Complaints in Patients with Acute Abdominal and Flank Pain. *Eurasian J Emerg Med* 2016;15:20-3. <http://www.akademikaciltip.com/sayilar/245/buyuk/20-23.pdf>

- Agrawal C, Adhikari S, Kumar M. Role of serum C-reactive protein and leukocyte count in the diagnosis of acute appendicitis in Nepalese population. *Nepal Med Coll J* 2008;10:11-5
- Lycopoulou L, Mamoulakis C, Hantzi E, et al. Serum amyloid A protein levels as a possible aid in the diagnosis of acute appendicitis in children. *Clin Chem Lab Med* 2005;43:49-53 (PMID: 156 (53442).
- Dalal I, Somekh E, Bilker-Reich A, Boaz M, Gorenstein A, Serour F. Serum and peritoneal inflammatory mediators in children with suspected acute appendicitis. *Arch Surg* 2005;140:169-73
- Aslan A, Karaveli Ç, Ogunc D, Elpek O, Karaguzel G, Melikoglu M. Does noncomplicated acute appendicitis cause bacterial translocation? *Pediatr Surg Int* 2007;23:555-8 (PMID: 17340160).
- Kaya B, Sana B, Eris C, Karabulut K, Bat O, Kutanis R. The diagnostic value of D-dimer, procalcitonin and CRP in acute appendicitis. *Int J Med Sci* 2012;9:909-15.
- Sand M, Bechara FG, Holland-Letz T, Sand D, Mehnert G, Mann B. Diagnostic value of hyperbilirubinemia as a predictive factor for appendicular perforation in acute appendicitis. *Am J Surg* 2009;198:193-8.
- Panagiotopoulou I, Parashar D, Lin R, et al. The diagnostic value of white cell count, C-reactive protein and bilirubin in acute appendicitis and its complications. *Ann R Coll Surg Engl* 2013;95:215-21
- Shogilev DJ, Duus N, Odom SR, Shapiro NI. Diagnosing appendicitis: evidence-based review of the diagnostic approach in 2014. *West J Emerg Med* 2014;15(7):859-71.
- Khan MN et al. Study of role of WBCs CRP in diagnosis of acute appendicitis. 2004.
- Vinoth Kumar. Study of diagnostic value of CRP in suspected acute appendicitis-prospective study. 2010.
- Shozoyokoyama. Large prospective study of CRP estimation in acute appendicitis done at Wakayama Medical Hospital. 2007.
- Asfar S, Safar H, Khoursheed M, Dashti H, al-Bader A. Would measurement of C-reactive protein reduce the rate of negative exploration for acute appendicitis? *J R Coll Surg Edinb.* 2000 Feb;45(1):21-4.