

Original Research

The Diagnostic Value of C-Reactive Protein Titer in Suspected Acute Appendicitis

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ABSTRACT:

Acute appendicitis is one of the most common causes of acute abdominal pain requiring surgical intervention. Despite its frequency, diagnosing appendicitis remains challenging, especially in atypical presentations or in early stages of the disease. Misdiagnosis can lead to unnecessary surgeries or delayed treatment with serious complications. While clinical examination and imaging are key components in diagnosis, laboratory biomarkers such as C-reactive protein titer (CRP T) have emerged as valuable supportive tools. Aim of this study is to assess accuracy of C-reactive protein titer in acute appendicitis. The prospective study will be conducted on patient have



symptoms and sign of acute appendicitis with high CRP titer presenting to general surgery of alwahda hospital. This study are in strong agreement with the data collected through the prospective observational method. The data were gathered from 24 patients presenting with clinical features suggestive of acute appendicitis, that included demographic details, symptoms, CRP titers, and final through operative findings or follow-up evaluation. The consistency observed between elevated CRP levels (≥ 2.5 mg/dL) and confirmed cases of acute appendicitis (18 out of 18) validates the reliability and integrity of the data collection process. Additionally, the identification of 3 false negatives (CRP < 2.5 mg/dL but diagnosis confirmed) highlights the sensitivity of the dataset to variations, reinforcing the importance of comprehensive clinical assessment. This prospective observational study suggests that CRP titer, in conjunction with clinical features (especially abdominal pain, fever, leukocytosis), While not definitive alone.

KEYWORDS: Acute Appendicitis, CRP Titer, Diagnostic Criteria, Derna Hospital.

INTRODUCTION

Acute appendicitis remains one of the most common causes of emergency abdominal surgery worldwide. Despite advances in diagnostic imaging and laboratory testing, the clinical diagnosis of appendicitis continues to pose a challenge, particularly in early or atypical cases.

Misdiagnosis may lead to unnecessary surgeries or, conversely, delays in treatment, increasing the risk of complications such as perforation or peritonitis. Therefore, identifying reliable biomarkers that can support clinical judgment is essential to improve diagnostic accuracy and patient outcomes.

Although CRP Titer is a nonspecific marker and may be elevated in other inflammatory or infectious conditions, its combined use with clinical examination and other laboratory findings such as white blood cell (WBC) count and neutrophil percentage can enhance diagnostic confidence. Moreover, CRP Titer measurement is relatively simple, cost-effective, and widely available, making it a practical option in both primary and Secondary healthcare settings.(1,2,4)

The importance of early and accurate diagnosis of acute appendicitis underscores the need to integrate biomarkers like CRP Titer into clinical protocols. This research aims to explore the diagnostic value of C-reactive protein Titer in cases of suspected acute appendicitis, based on current literature and clinical evidence.

Through this review, we seek to assess the reliability of CRP Titer as a supportive diagnostic tool, its limitations, and how it may contribute to reducing diagnostic errors and improving patient care. By evaluating the sensitivity and specificity of CRP Titer in different clinical scenarios, this study provides insights into its practical application in everyday medical practice. (1) (2)

MATERIALS AND METHODS

A cohort prospective study was used to collected data from surgical department at derna alwahda hospital. Twenty-four patients were admitted and diagnosed with acute appendicitis by Ranson's criteria.

After routine lab. Investigation (cbc, fasting blood sugar, CRP titer, cross match and typing with viral screen) and image (ultrasound abdomen and pelvis reports). All patients

submitted to appendectomy was finding correlated with significant elevated of titer.

RESULTS AND DISCUSSION

A total of twenty-four patients with clinically suspected acute appendicitis were enrolled in this prospective study conducted at Alwahda Hospital, Derna. The demographic analysis showed that the majority of patients were between 11 and 20 years of age, representing 50% of the cases, followed by 29.2% in the 21–40 years group. The male-to-female ratio was approximately equal, and most patients presented with classical symptoms including abdominal pain (100%), nausea and vomiting (91.7%), and fever (83.3%).

CRP titer levels demonstrated a strong correlation with the final surgical diagnosis. Elevated CRP levels (≥ 2.5 mg/dL) were found in 18 patients, all of whom had histopathologically confirmed appendicitis. In contrast, among patients with CRP levels below 2.5 mg/dL, three were confirmed cases and three were not, indicating a few false negatives. The overall sensitivity and specificity of CRP in diagnosing acute appendicitis were 90% and 100%, respectively, while the positive predictive value was 100% and the negative predictive value was 66.7%.

These findings suggest that CRP titer is a valuable diagnostic marker when interpreted alongside clinical presentation and imaging results. The strong positive predictive value confirms its reliability in supporting the diagnosis, particularly in typical presentations. However, the presence of false negatives highlights its limitation in early or atypical cases. Therefore, CRP should be used as an adjunctive rather than a standalone diagnostic tool. The results of this study align with previous research. Andersson (2004) emphasized that CRP, in combination with WBC count and clinical signs, enhances diagnostic accuracy. Yu et al. (2013)

similarly found that CRP has good sensitivity and specificity when integrated with other markers. Khan et al. (2004) reported a strong association between elevated CRP and confirmed appendicitis, while Al-Gaithy (2012) noted that CRP alone may be unreliable in early-stage disease, especially among pediatric patients. Conversely, Markar et al. (2010) argued that CRP is insufficient as a primary diagnostic indicator in children. Collectively, these studies, along with our findings, reinforce that CRP is an important supportive biomarker but must always be interpreted within the clinical context.

Table 1. Demographic Characteristics

Age group	Number of Patients	Percentage
11–20 years	12	50%
21–40 years	7	29.2%
>40 years	1	4.2%
≤ 10 years	4	16.6%

Table 2. Clinical Presentation

Symptom	Number of Patients	Percentage
Abdominal pain	24	100%
Nausea and vomiting	22	91.7%
Anorexia	22	91.7%
Fever	20	83.3%
Localized tenderness	>20	>83.3%

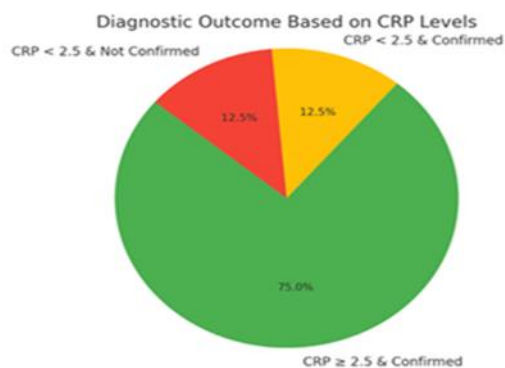
Table 3. CRP Titer Levels

CRP Titer (mg/dL)	Number of Patients	Percentage
≥ 2.5	18	75%
< 2.5	6	25%

Table 4. CRP Titer vs. Final Diagnosis

CRP Titer	Appendicitis Confirmed	Not Confirmed	Total
≥ 2.5 mg/dL	18	0	18
< 2.5 mg/dL	2	4	6
Total	20	4	24

CONCLUSION



The pie chart illustrates the percentage distribution of patients categorized according to their CRP titer level and whether their diagnosis of acute appendicitis was confirmed..

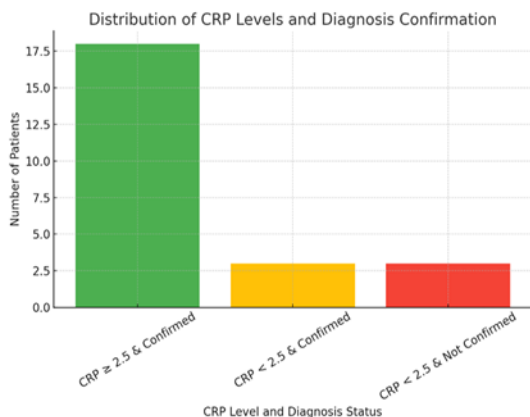
Table 5. Diagnostic

Indicator	Value
Sensitivity	90%
Specificity	100%
Positive Predictive Value (PPV)	100%
Negative Predictive Value (NPV)	66.7%

Category	Percentage	Explanation
CRP ≥ 2.5 mg/dL & Diagnosis Confirmed	75%	All patients with elevated CRP had confirmed appendicitis.
CRP < 2.5 mg/dL & Diagnosis Confirmed	12.5%	Some patients had low CRP but were still confirmed with appendicitis.
CRP < 2.5 mg/dL & Diagnosis Not Confirmed	12.5%	Patients with low CRP who were not diagnosed with appendicitis

A CRP level ≥ 2.5 mg/dL is strongly associated with confirmed appendicitis.

However, the presence of confirmed cases with low CRP titer levels indicates that low CRP titer does not exclude the diagnosis/



The bar chart shows the number of patients in each diagnostic category based on their CRP titer levels.

Category	Number of Patients	Explanation
CRP ≥ 2.5 mg/dL & Diagnosis Confirmed	18	All patients in this group were surgically confirmed with appendicitis.
CRP < 2.5 mg/dL & Diagnosis Confirmed	3	These patients had low CRP but still had appendicitis.
CRP < 2.5 mg/dL & Diagnosis Not Confirmed	3	Low CRP levels and no appendicitis diagnosis.

The bar chart clearly emphasizes the strong correlation between elevated CRP titer and confirmed diagnosis.

It also highlights the existence of false negatives, showing that CRP titer alone should not be used for ruling out appendicitis.

These results visually support the reliability of CRP titer as a positive predictive marker when elevated, but not as an exclusion tool when low.

CONCLUSION

The study concluded C-reactive protein titer levels, particularly values ≥ 2.5 mg/dL, are strongly associated with confirmed acute appendicitis and can aid clinicians in early diagnosis. However, CRP should be interpreted as part of a comprehensive clinical evaluation, and not as a sole diagnostic indicator.

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ETHICS

The Research Ethics Committee, has reviewed and approved the above mentioned paper.

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المخلص

يُعد التهاب الزائدة الدودية الحاد أحد أكثر أسباب آلام البطن الحادة شيوعاً والتي تتطلب تدخلاً جراحياً. على الرغم من شيوعه، إلا أن تشخيص التهاب الزائدة الدودية لا يزال صعباً، خاصةً في الحالات غير النمطية أو في المراحل المبكرة من المرض. قد يؤدي التشخيص الخاطئ إلى عمليات جراحية غير ضرورية أو تأخير العلاج مع مضاعفات خطيرة. في حين أن الفحص السريري والتصوير الطبي عنصران أساسيان في التشخيص، فقد برزت المؤشرات الحيوية المخبرية، مثل مستوى البروتين المتفاعل C (CRP)، كأدوات داعمة قيمة. تهدف هذه الدراسة إلى تقييم دقة مستوى البروتين المتفاعل C في تشخيص التهاب الزائدة الدودية الحاد. سُجرت الدراسة المستقبلية على المرضى الذين يعانون من أعراض وعلامات التهاب الزائدة الدودية الحاد مع ارتفاع مستوى البروتين المتفاعل C، والذين يراجعون قسم الجراحة العامة في مستشفى الوحدة. تتوافق نتائج هذه الدراسة بشكل كبير مع البيانات التي جُمعت من خلال أسلوب الملاحظة المستقبلية. جُمعت البيانات من 24 مريضاً ظهرت عليهم أعراض سريرية تُشير إلى التهاب الزائدة الدودية الحاد، وشملت هذه البيانات التفاصيل الديموغرافية، والأعراض، ومستويات البروتين المتفاعل C، والنتائج النهائية من خلال الجراحة أو تقييم المتابعة. يؤكد التوافق الملحوظ بين ارتفاع مستويات البروتين التفاعلي ≥ 2.5 C (ملغم/ديسيلتر) والحالات المؤكدة لالتهاب الزائدة الدودية الحاد (18 من 18) موثوقية عملية جمع البيانات ودقتها. بالإضافة إلى ذلك، يُبرز رصد 3 حالات سلبية خاطئة (مستوى البروتين التفاعلي $C > 2.5$ ملغم/ديسيلتر مع تأكيد التشخيص) حساسية البيانات للتغيرات، مما يُعزز أهمية التقييم السريري الشامل. تشير هذه الدراسة الرصدية المستقبلية إلى أن مستوى البروتين التفاعلي C، بالاقتران مع الأعراض السريرية (خاصةً ألم البطن، والحمى، وكثرة الكريات البيضاء)، ليس كافياً وحده لتشخيص التهاب الزائدة الدودية الحاد.

الكلمات المفتاحية: التهاب الزائدة الدودية الحاد، مستوى البروتين التفاعلي C، معايير التشخيص، مستشفى درنة.

