

## ORIGINAL ARTICLE

**Role of CRP in Evaluating Acute Abdominal Pain: An Observational Study**RAHEEL AZHAR<sup>1</sup>, RAAZIA RAMZAN<sup>2</sup>, SAAD ASLAM<sup>3</sup>, JASSIM JABBAR<sup>4</sup>, MADIHA KARIM<sup>5</sup>, OVAIS MALIK<sup>6</sup><sup>1-6</sup>Doctor, Dow University Hospital/Dow University of health sciences Karachi PakistanCorrespondence to: Raheel Azhar, Email: [raheel.azhar123@gmail.com](mailto:raheel.azhar123@gmail.com)**ABSTRACT****Background:** C-Reactive Protein (CRP) is an acute phase reactant that is routinely used in evaluation of cases with acute abdomen. We determined levels of CRP in patients with surgical causes that were either treated with operative or with non operative measures, and patients with non-specific abdominal pain.**Objective:** The aim of this study was to identify the use of C-reactive protein in differentiating between surgical causes of acute abdomen and non specific abdominal pain.**Study Design:** This is a prospective observational cohort study.**Methodology:** This study was conducted in General Surgery Department of Dow University Hospital, Ojha Campus, Karachi from January 2022 till October 2022. A total of 116 patients admitted with acute abdomen via Emergency were included in this study.**Results:** A total of 7 patients had non specific abdominal pain whereas the remaining 109 patients had surgical causes. 57 of those patients were managed conservatively while 52 underwent surgical interventions. Median value of CRP turned out to be 50, however CRP levels of the three groups had no significant impact on the evaluation of acute abdomen.**Practical Implications:** CRP levels are actively monitored in patients with acute abdomen. This study was conducted to find out if CRP levels can help assess the treatment of choice in such patients. The end result showed that CRP alone isn't a helpful parameter to assess patients with acute abdomen.**Conclusions:** CRP is not a reliable marker in determining whether the patient has surgical abdominal pain or a non specific one. There is still room for further analysis to look for acute inflammatory markers that could help us evaluate the cause behind abdominal pain and guide us in devising a management strategy for the same.**Keywords:** CRP, C-reactive protein, Acute Abdomen, Non specific abdominal pain, operative intervention, non-operative intervention.**INTRODUCTION**

Around 5-10% of presenting complaints in the emergency department correspond to abdominal pain.<sup>1</sup> Patients presenting with abdominal crises can have a myriad of diagnoses like appendicitis, cholecystitis, diverticulitis and perforated bowel.<sup>2</sup> A wide array of presentation warrants different investigation leading up-to diagnosis and further intervention. Therefore, a relevant history, physical examination, initial assessment, appropriate laboratory investigation pointing towards a diagnosis; conforming severity and timely appropriate intervention is required to prevent morbidity and mortality. Acute Abdomen is one such condition, that presents with sudden abdominal pain, nausea and vomiting, and requires a number of investigations to find out the root cause. Physical examination might reveal a diffuse abdominal pain while, localized pain in any quadrant further helps in assessing the underlying pathology which may be caused by infection, inflammation etc. Of interest and main part of our study is an acute phase reactant, C-Reactive protein<sup>3</sup>. Its importance has been debatable in identifying and determining the severity of underlying pathology; however, its importance does reflect more in the post operative period. Presently majority of studies indexed on PubMed reportedly have not discussed much about the role of CRP in the preoperative phase and its importance in guiding a well-planned intervention plan. Its use in a developing country like Pakistan carries a significant burden on cost and well-informed planning to use it needs should be evaluated extensively. Our aim is to find out the importance of evaluating CRP levels in different pathological conditions presenting with an acute abdomen, that either progress to an emergency laparotomy in relation to its levels and findings in parallel, requiring a tailored approach and a guiding tool.

**MATERIAL AND METHODS**

This is an observational prospective cohort study that was conducted after approval from ethical committee in the surgery department of Dow University Hospital, Qiha campus, Karachi, Pakistan from January 2022 to October 2022. One hundred and sixteen patients with acute abdomen that were admitted through Emergency department were included in this study. An organized proforma was filled after written and informed consent from the patients. Details regarding patient's bio-data, presenting complain,

clinical examination, CRP levels, radiological findings, admitting diagnosis, operative findings and final diagnosis were documented. CRP levels were measured in serum using Polyethylene Glycol (PEG) enhanced immune turbid metric assay. CRP levels within the first 24 hours of admission were measured and its diagnostic value was determined based off the final diagnosis of the patient.

**RESULTS**

To determine the association of CRP with acute abdomen STATA 16.0 software was used for the purpose of analysis. Categorical variables are presented as frequencies and percentages. Continuous variables, if normally distributed are presented as means and standard deviations, while median (interquartile range) values are given for non-normally distributed data. The normality tests were performed using the Shapiro-Wilk Normality test. Anova tests was used to compare CRP levels and acute abdomen groups. Further intergroup comparison was done by Fisher's protected LSD test. A P-value less than 0.05 was considered significant.

Table 1A: Admitting diagnosis of patients with acute abdomen

Admitting Diagnosis	N(%)
Peritonitis	11 (9.40)
Acute Appendicitis	24 (20.51)
Acute Appendicitis with Enterocutaneous Fistula	01 (0.85)
Acute calculus Cholecystitis	33 (28.21)
Acute biliary Pancreatitis	10 (8.55)
Appendicular Lump	05 (4.27)
Intestinal Obstruction	32 (27.35)
Liver Abscess	01 (0.85)

Table 1B: Discharging Diagnosis Of Patients With Acute Abdomen

Diagnosis	N
Acute Appendicitis	22
Acute Calculus Cholecystitis	21
Intestinal Obstruction	15
Acute Pancreatitis	12
Subacute Intestinal Obstruction	11
Non-Specific Abdominal Pain	8
Perforated Appendix	4
Appendicular Lump	4
Cholelithiasis And Choledocholithiasis	2

Liver Abscess	2
Duodenal Perforation	2
CLD With Portal Hypertension	1
Large Intestinal Perforation	1
Ovarian Cyst	1
Perforated Gall Bladder	1
Post Op Abdominal Collection	1
DCLD	1
Diverticular Abscess	1
Empyema Gallbladder	1
Large Intestinal Perforation	1
Biliary Fistula	1

Table 2: comparison of CRP levels with different acute abdomen groups

CRP levels	Acute abdomen (n=116)			P-value
	Non-specific abdominal pain (n=7)	Surgical condition (n=109)		
		Non-operative intervention (n=57)	Operative intervention (n=52)	
<6mg/l	1	4	7	0.278
>6-50 mg/l	2	17	11	
>50-100 mg/l	4	15	13	
>100-150 mg/l	0	6	11	
>150 mg/l	0	15	10	

Of the 117 patients included in this study, 52.14% were males while 47.86% were females. Mean age was  $40.3 \pm 17.2$  years. Tables depicting showing initial diagnosis and discharging diagnosis of patients respectively (As shown in table 1A and 1B)

The Patients with acute abdomen were further divided into two groups, 109 with surgical condition while 7 with non-specific abdominal pain. 57 out of the 109 patients with surgical conditions were managed conservatively while 52 were operated within 24 hours of admission. Median CRP was 50. CRP levels when compared with three different groups of acute abdomen showed no significant association with evaluation of acute abdominal pain (p-value>0.05). Intergroup comparison between the groups using Fisher's protected LSD test was also not significant (As shown in table 2)

## DISCUSSION

C-Reactive protein is an acute phase reactant which along with other inflammatory markers is released in response to interleukin-6 (IL-6). It was first discovered by Tillet and Francis in 1930 when they showed its reaction to C-polysaccharide of *Streptococcus pneumoniae* in patients suffering from pneumococcal pneumoniae. Its role in indicating active bacterial infections and inflammation is highly sensitive and indicative of a severe underlying pathology. Its role in emergencies likely, requiring intervention within 24 hours remains a controversy<sup>4</sup>. Our study hasn't yielded a significant value in determining the relationship between its level preoperatively and the need of a surgical intervention.

Salem et.al. reported that CRP has mainly been investigated for cases presenting with acute appendicitis mostly but general its role in acute abdomen raises a few eyebrows<sup>5</sup> as it doesn't necessarily indicate a diagnoses but an elevated level blurs the decision in carrying out further unnecessary investigations<sup>6</sup>. Comparing meta-analysis, one questions the usefulness of using CRP as a predictive tool for diagnoses while the other shows it to be inferior if used alone and concludes using it in a combination<sup>7-8</sup>.

While Wu et.al. reportedly supports the use of CRP especially in acute appendicitis. Our study found majority of patients presenting with acute abdomen with acute appendicitis, peritonitis etc. as well<sup>13</sup>. However, its significance is time-bound,

earlier investigation results lead to an intervention soon<sup>9</sup>. However, Meyer et.al. has a different point of view from the experience of their cases, as they argue in maintaining that inflammatory markers like CRP can be deceiving leading to unnecessary intervention<sup>10</sup> while CRP's activity is reported to have a delayed onset as compared to interleukin-6 (IL-6)<sup>11</sup>.

The results our study produced lie in the middle as a few were operated on, medically managed and discharged in due course with acute appendicitis been the most common diagnosis of all. Inadvertently, as it seems, there is still room to look and rely for more inflammatory markers to rely on diagnosis, where Becker et.al. presented the idea of testing Procalcitonin, and found that it is more useful in detecting complicated appendicitis<sup>12-13</sup>

## CONCLUSION

CRP is not a reliable marker in determining whether the patient has surgical abdominal pain or a non specific one. There is still room for further analysis to look for acute inflammatory markers that could help us evaluate the cause behind abdominal pain and guide us in devising a management strategy for the same.

### Declarations

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**Ethical approval:** not needed

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