

# Diagnostic Value of Total Leucocyte Count and C-reactive protein in Acute Appendicitis

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## ABSTRACT

**Aim:** To determine the value of pre-operative total leucocyte count (TLC) and C-reactive protein (CRP) in diagnosis of acute appendicitis.

**Methods:** We carried out this study in general surgical unit of King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia. All patients aged 12 and above undergoing appendectomy from May 2013 to February 2014 were studied. Incidental appendectomies were excluded. All patients were analyzed in regards to pre-operative TLC, CRP and final histology.

**Results:** Total of 100 patients were diagnosed as acute appendicitis and underwent emergency appendectomy. TLC and CRP were performed for all the patients pre-operatively. TLC had a sensitivity of 72.41% and specificity of 69.23% where as CRP showed 78.16% sensitivity and 61.53% specificity. Positive predictive value (PPV) was 94.02% for TLC and 93.15% for CRP. Negative predictive value (NPV) was 27.27% for TLC and 26.92% for CRP. Combined TLC and CRP showed sensitivity of 89.28%, specificity of 83.33%, PPV of 98.03% and NPV of 45.45%.

**Conclusion:** We concluded that TLC and CRP are better predictors of presence or absence of acute appendicitis when both are considered together rather than individually.

**Keywords:** Negative, appendectomy, total leucocyte count, C-reactive protein.

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## INTRODUCTION

Acute appendicitis is universally one of the commonest surgical emergencies. The diagnosis of acute appendicitis can vary from a straightforward to a very devious decision. Surgeons have conventionally relied on clinical examination for diagnosis but additional tests are required to reduce the rate of negative appendectomy, which is about 10-15% or even higher<sup>1</sup>. Apart from radiological investigations, simple laboratory investigations like TLC and neutrophil count have traditionally been advised to aid the clinical diagnosis. Now over a decade CRP has been advocated in the literature<sup>2,3</sup>. However some studies did not find CRP very helpful in diagnosing acute appendicitis<sup>4,5</sup>. Our study was meant to evaluate both TLC and CRP in regards to diagnosing acute appendicitis.

## MATERIAL & METHODS

This study was carried out at general surgical unit of King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia. The study period was from March 2013 to February 2014. All patients aged 12 and above were included in the study. Incidental appendectomies were excluded. All the patients in the study were

analyzed for pre-operative TLC and CRP on presentation in emergency room along with final histology. The sensitivity, specificity, PPV and NPV were calculated for TLC and CRP individually, and both combined.

## RESULTS

Total of 100 patients underwent emergency appendectomy in our study period of ten months. The mean age was 25.43 years with a range from 12 to 53 years. There were 62 males and 38 females with a male to female ratio of 1.63: 1. All the patients had TLC and CRP before proceeding for appendectomy. TLC correctly indicated presence or absence of appendicitis in 72 out of 100 (72%) patients (Table 1) where as CRP correctly diagnosed appendicitis in 76 out of 100 (76%) patients (Table 2). Both TLC and CRP combined, diagnosed or excluded acute appendicitis correctly in 55 out of 62 (88.70%) patients (Table 3). Sensitivity, specificity, PPV and NPV were calculated and compared individually for TLC and CRP as well as both combined (Table 4)

Table 1: Pre-operative TLC & Final histology results for Acute Appendicitis

	Histology Positive	Histology Negative
Elevated TLC (67)	63	4
Normal TLC (33)	24	9

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Table 2: Pre-operative CRP and Final histology results for Acute Appendicitis

	Histology Positive	Histology Negative
Elevated CRP (73)	68	5
Normal CRP (27)	19	8

Table 3: Pre-operative TLC / CRP Combined and Final histology results for Acute Appendicitis

	Histology Positive	Histology Negative
Elevated TLC & CRP (51)	50	1
Normal TLC & CRP (11)	6	5

Table 4: Comparison between all three groups

	TLC	CRP	Combined (TLC & CRP)
Sensitivity	72.41%	78.16%	89.28%
Specificity	69.23%	61.53%	83.33%
PPV*	94.02%	93.15%	98.03%
NPV**	27.27%	29.62%	45.45%

\*Positive predictive value,

\*\*Negative predictive value

## DISCUSSION

TLC and CRP are one the main laboratory tests to aid the clinical examination for diagnosis of acute appendicitis or otherwise. Opinion is divided as regards diagnostic value of TLC and CRP due to variable results. Regular use of TLC<sup>6</sup> and CRP<sup>2</sup> has been advised by some studies in suspected cases of acute appendicitis. Others did not find it of significant help<sup>4,5</sup>. Our analysis of TLC and CRP as diagnostic tool to acute appendicitis also did not show any significant advantage of one over the other. The sensitivity for both ranged from 72-78% where as specificity was between 62-69%. The PPV and NPV were in range of 93-94% and 27-30% respectively for both. Timing of taking the pre-operative blood samples for the said investigations is also important as TLC has been linked to early inflammation where as CRP is described as a late marker<sup>7</sup>. CRP is directly related to the severity of appendicitis, being higher in perforated cases and highest if there are gangrenous changes in the appendix or abscess formation<sup>7-9</sup>. The value of TLC and CRP as a diagnostic tool for diagnosing acute appendicitis is lot more when both are considered together<sup>7,9,10</sup>. This is also evident in our study where the combined TLC and CRP had about 14-18% increase in sensitivity and specificity in comparison to the average recorded in individual groups. Similarly PPV and NPV also

increased by 4% and 17% respectively in combined group.

## CONCLUSION

We concluded that combined TLC and CRP are superior predictors of presence or absence of acute appendicitis in comparison to individual TLC or CRP.

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