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CORRELATION OF CRP AND TOTAL LEUKOCYTE COUNT IN ACUTE INFECTIONS

Dr Shehzina Saeed[1], Dr Fizza Khalid[2], Dr Ayesha Nawaz[3]

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Abstract:

Introduction: *Invasion of body tissue by a disease-causing microbiological agent along with their multiplication in the host tissue is known as an infection.* ***Objectives:*** *The main objective of the study is to investigate the correlation of CRP and total leukocyte count in acute infections.* ***Material and methods:*** *This cross-sectional study was conducted in Health department Punjab during July 2019 to January 2020. Patients' age, sex, focus of infection, and number and type of spaces involved were recorded. Various clinical variables of clinical severity scale including change in degree of swelling (measured by thread and scale), changes in the amount of pain (measured by verbal pain scale), presence or absence of pus, improvement in mouth opening and dysphagia or dyspnoea (if symptoms were present) were scored.* ***Results:*** *The data was collected from 50 patients. There was very highly significant correlation between the markers except monocytes and eosinophil. The scale indicated a strong correlation with these inflammatory markers and hence was found to be validated. The CRP showed a significant strong positive correlation as compared to TLC which showed a moderately positive correlation with clinical severity of infection.* ***Conclusion:*** *It is concluded that CRP and TLC including ANC are valuable markers in acute bacterial infections as they have a positive correlation with each other.*

Corresponding author:
Dr. Shehzina Saeed,

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INTRODUCTION:

Invasion of body tissue by a disease-causing microbiological agent along with their multiplication in the host tissue is known as an infection. Bacteria are classified as one of the most common pathogens, causing infection of nearly all body tissues in both community as well as nosocomial settings [1]. Despite enormous advancements in the field of health care, acute infections caused by bacteria, viruses, parasites, fungi and helminthes play a major role in morbidity and mortality. Various diagnostic modalities, such as total leukocyte count (TLC), neutrophil count, C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), Prolactin and blood culture tests, are required to detect infection [2].

The clinical signs may sometimes appear late or may be insufficient to give precise assessment of an infectious process. Many laboratory markers have been used to predict the severity and course of infections, thereby avoiding the potential risk of patients slipping into further complications. These include TLC, DLC, ESR, Pre-albumin, Pro-calcitonin and C-reactive protein (CRP) [3]. Quantitative determination of serum markers can help in determining therapeutic efficacy of different treatment regimes of infection, for monitoring post-operative infections, for investigating levels of infections and appropriate use of antibiotics [4].

Both CRP and TLC have been known to rise in an infectious process. TLC represents the cellular arm of immunity whereas CRP is the humoral component. Rise in serum CRP concentration is seen up to 1000-fold within few hours of severe infections. Also CRP has a very short half life of 5–7h as compared to a life span of 5–6 days for leucocytes. This short half life makes it a more sensitive indicator of infection [5].
It has been well documented that there are certain acute-phase reaction proteins, including C-reactive protein (CRP), which are raised in various inflammatory conditions. If CRP can be added to the already existing laboratory tests, the diagnosis of acute appendicitis with clinically suggestive signs can be made with a fair degree of accuracy and, as such, unnecessary appendectomies can be avoided [6].

Objectives

The main objective of the study is to investigate the correlation of CRP and total leukocyte count in acute infections.

MATERIAL AND METHODS:

This cross-sectional study was conducted in Health department Punjab during July 2019 to January 2020. Patients' age, sex, focus of infection, and number and type of spaces involved were recorded. Various clinical variables of clinical severity scale including change in degree of swelling (measured by thread and scale), changes in the amount of pain (measured by verbal pain scale), presence or absence of pus, improvement in mouth opening and dysphagia or dyspnoea (if symptoms were present) were scored.

Complete blood counts (CBCs) and CRP levels were determined on first visit. CBC samples were collected in EDTA tubes and were analysed. For CRP estimation serum separator tubes were utilized and later centrifuged at 3000 rpm for 10-15 minutes. CRP levels were determined by immuno-turbidimetry technique on Rx Daytona analyzer.
The data was collected and analysed using SPSS version 19. All the values were expressed in mean and standard deviation.

RESULTS:

The data was collected from 50 patients. There was very highly significant correlation between the markers except monocytes and eosinophil. The scale indicated a strong correlation with these inflammatory markers and hence was found to be validated. The CRP showed a significant strong positive correlation ($\rho = 0.754$, $p = 0.000001$) as compared to TLC which showed a moderately positive correlation ($\rho = 0.607$, $p = 0.000001$) with clinical severity of infection. The CRP values were increased in all 50 (100 %) patients as compared to TLC values which were increased only in 32 (64 %) patients at the time of admission.

Table 01: Correlation of CRP and TLC with CSS

Lab parameter	Correlation (ρ)	Significance (*p* value)
CRP	0.754	0.000001
TLC	0.607	0.000001
N	0.744	0.000001
L	0.746	0.000001
M	−0.148	0.019
E	−0.061	0.340

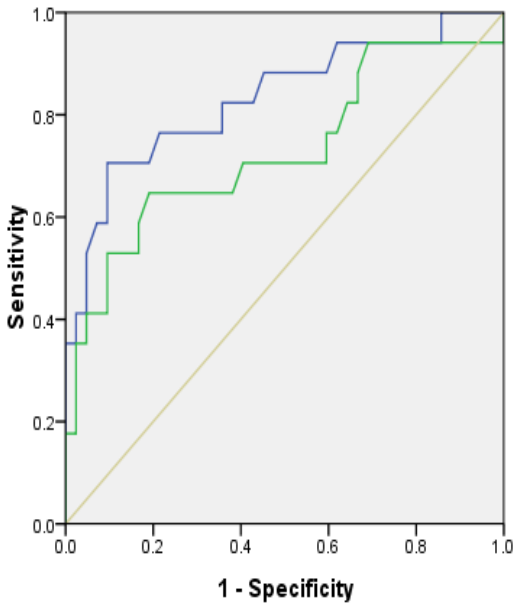

Figure 1: ROC curve of correlation of C-reactive protein (CRP) with total leukocyte count (TLC)

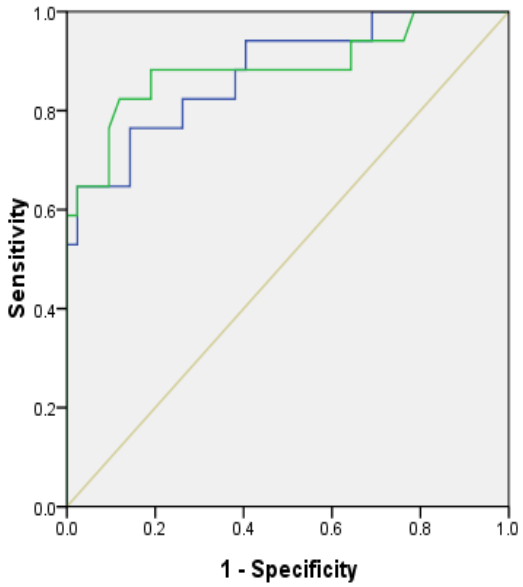

Figure 2: ROC curve of C-reactive protein (CRP) with absolute neutrophil count (ANC)

DISCUSSION:

CRP was identified in 1930 by Tillet and Francis and is regarded as the acute-phase protein. It has been studied as a screening device for inflammation, a marker for disease activity and as a diagnostic adjunct. Physiologically, CRP enhances cell-mediated immunity by promoting phagocytosis, accelerating chemotaxis and activating platelets. CRP is a reliable early indicator of inflammation or injury [7]. Mustard et al. documented that serial postoperative CRP levels could predict septic complications before their clinical manifestation.

Even older studies have shown that CRP is a useful diagnostic tool in evaluation of children with febrile illness [8]. In contrast to this, however, another older study found that CRP value added to ANC is of litt le diagnostic value as compared to ANC alone in screening occult bacterial infections in children. A study conducted on patients with acute appendicitis in the Nepalese population by Agrawal et al demonstrated a correlation between ANC and CRP with histological findings of appendicitis [9]. They concluded that both parameters were significantly raised in inflammatory diseases, i.e. acute appendicitis, which is consistent with our own study. This is useful as it may guide the surgeon on necessity for surgery [10].

CONCLUSION:

It is concluded that CRP and TLC including ANC are valuable markers in acute bacterial infections as they have a positive correlation with each other. When they are measured together, it increases their diagnostic value because of their feasibility and sensitivity.

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