Mini Review

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The Role of C - Reactive protein in Inflammatory Diseases: Insights from a Mini-Review.

Thakngam Wangsu[1*], Dr. Jadab kishore Phukan[2]

1. Department of Biochemistry,
2. Department of Biochemistry

L.G.B Regional Institute of Mental Health, Tezpur, Assam; India
(*An Autonomous Institute under Ministry of Health and family welfare, GOI*)

Corresponding author

Thakngam Wangsu*,
L.G.B Regional Institute of Mental Health, Tezpur, Assam; India
Email : thakngamwangsu69@gmail.com,

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ABSTRACT

C-reactive protein, or CRP, is a well-known biomarker for inflammation and plays a crucial role in the immune response of the body. The clinical use of CRP in the diagnosis and treatment of inflammatory illnesses, such as infections, rheumatoid arthritis, and cardiovascular disorders, is examined in this mini-review. We go through the biochemical characteristics of CRP, how it contributes to inflammation, and how CRP levels affect clinical practice.

Keywords : *C- Reactive Protein, Inflammatory, Cardiovascular Diseases, Acute phase protein, CRP in Rheumatoid Arthritis (RA), Inflammatory Bowel Disease (IBD), Systemic Lupus Erythematosus (SLE).*

INTRODUCTION

Inflammation is a key pathological process in many diseases, so the need for precise diagnostic and monitoring biomarkers of inflammatory status are clear. A preferentially synthesized CRP as an acute-phase protein of the liver in response to inflammation.CRP is an important marker in clinical practice as increased CRP levels are a sign of acute-phase inflammatory and infection conditions. The objectives of this review are to examine the processes behind CRP's involvement in inflammatory illnesses, provide an overview of recent research findings, and identify knowledge gaps.

MATERIALS AND METHODS

A comprehensive review of the Scopus, PubMed, and Web of Science databases produced a selection of the literature. Articles published from 2000 to March 2023 were included. The search terms: "infections", "rheumatoid arthritis", "cardiovascular diseases", "inflammation", and "C-Reactive Protein" were combined. The inclusion criteria for studies were that they had to be published in English, undergo peer review, and provide substantial insights into the function of CRP in inflammation. Case reports and Editorials were not included. Only Original articles, review papers, and meta-analyses were included.

Biochemical Properties and Regulation of CRP

CRP is a protein that belongs to the pentraxin family, which is distinguished by its cyclic pentameric structure.Because acute-phase reactions can result in a considerable increase in CRP blood levels and because it is strictly regulated at the transcriptional level, CRP is a valuable biomarker for inflammation [1-3]. Phosphocholine, which is present on the surface of certain bacteria and dead or dying cells, is bound by CRP, enabling phagocytes to opsonise and eliminate the bacterial particles. This feature emphasizes the part CRP plays in the innate immune system, which helps the host fight off infections [4].

CRP in Cardiovascular Diseases

- **Pathophysiology:** Inflammation has an undeniable part in atherosclerosis construction. High CRP levels are connected with an increased likelihood of cerebrovascular accident and acute myocardial infarction as cardiovascular events [8–9].
- **Clinical Significance:** High-sensitivity CRP (hs-CRP) assays are available to assess cardiovascular risk. It has been shown that hs-CRP can predict future cardiovascular events beyond other traditional risk factors [10-12]. Vermeire et al. stressed the role of CRP as a marker for cardiovascular diseases [9]. From reference [23] also emphasizing on the predictive value of CRP in cardiovascular risk assessment.

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CRP in Rheumatoid Arthritis (RA)

- **Pathophysiology:** RA is a chronic inflammatory disorder affecting joints. Levels of CRP correlate with disease activity and joint inflammation [13-14].
- **Clinical Significance:** The monitoring of CRP levels aids in the assessment of disease activity and response to therapy. In RA patients, high CRP levels might signal higher risks for joint damage and poorer prognosis [15-16].

CRP in Infections

- **Pathophysiology:** The acute-phase reaction produced by infection raises CRP levels. CRP is a nonspecific marker of inflammation and infection [17–18]
- **Clinical Significance:** CRP levels help to differentiate bacterial and viral infections. Higher levels of CRP indicate bacterial infections, therefore acting as a guide to administer antibiotics [19-20]. Ansar and Ghosh have discussed the role of CRP in differentiating bacterial infections from viral ones, thus emphasizing its diagnostic value [24].

CRP in Other Inflammatory Conditions

- **Inflammatory Bowel Disease (IBD):** CRP levels correlate with disease activity in Crohn's but are less reliable in ulcerative colitis [21-22]. In Crohn's disease, however, CRP can be reliable for inflammation and as an aid to monitor disease activity and response to therapy [23].
- **Systemic Lupus Erythematosus (SLE):** The less specificity of CRP in SLE is due to its variable expression; elevated levels may indicate the presence of concurrent infections or serositis [24-25]

DISCUSSIONS

According to the compiled data, CRP is a useful biomarker for a number of inflammatory illnesses. Its rapidity of response to inflammation makes it a useful tool in clinical practice. Given it is non-specific, clinical observations and other diagnostic tests need to be considered with caution alongside this. CRP has reported to be high predictive values in cardiovascular disease progression, correlation with RA and also specific regarding bacterial infection walking a very thin path between healthy status may not show CRP contrasts. Also needed are clinical and immunologic correlates of CRP in individual diseases (such as SLE, where levels do not always parallel disease activity). These include: heterogeneity amongst CRP testing methods and patient demographics, which has been shown to be an important factor in certain studies

CONCLUSION

Inflammatory diseases are another example and CRP is crucial in this disease. Due to its utility both in the diagnosis and follow up of inflammation-associated diseases, it is an irreplaceable biomarker used for disease monitoring. Further research should be directed towards enhancing the diagnostic accuracy of CRP, as well also to exploring its use in treatment targeting. The detailed elucidation of how CRP resides at the juncture numerous inflammatory pathways may subsequently inform more targeted therapy, improving patient outcomes.

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