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C-Reactive Protein Levels and its Association with Acute and Chronic Inflammatory Diseases- An Observational Study

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ABSTRACT

Background: C-reactive protein is a nonspecific, acute-phase, inflammatory protein, whose expression is increased in response to tissue injury, inflammation and infection. The highest concentrations of CRP are found in an individual having some bacterial infections where CRP level increase up to 1,000-fold. The present study was undertaken to determine the C-reactive protein levels in clinically suspected OPD and IPD patient by Latex agglutination test (LAT).

Material and Methods: Blood samples were collected from clinically suspected OPD and IPD patients with signs of inflammation in plain vacutainer tubes and received in Serology laboratory of Microbiology Department for CRP testing. All blood samples were screened by Qualitative CRP assay by using commercially available kit. Blood samples that were positive were further tested for CRP titre by semi-quantitative test using same kit (Beacon Diagnostics Pvt Ltd).

Results: A total of 450 serum samples were received for CRP testing during a period of six months. Higher CRP levels were obtained in patients with chronic inflammatory diseases (76%) and as compared to patients with acute inflammatory diseases (24%).

Conclusion: CRP is an inexpensive and easily available serological test helpful in correlating severity and mortality of any disease. Early CRP testing can be a very helpful tool to improve the clinical outcomes of patients and decreased mortality.

KEYWORDS: C-Reactive protein, chronic inflammatory disease, acute inflammatory disease, semi- quantitative

INTRODUCTION

Inflammation is a natural defense reaction by the cells of the body to allergic or chemical react ions, injury, burns, stress and infect ions by bacteria, virus or fungi, or any harm by drugs, toxins or alcohol.[1]

C-reactive protein is a nonspecific, acute-phase, inflammatory protein, whose expression is increased in response to tissue injury, inflammation, and infection. It binds to the phosphocholine expressed on the surface of dead or dying cells and some bacteria. This activates the complement system, promoting phagocytosis by macrophages, which clears necrotic and apoptotic cells and bacteria.[is comprised of 224 -amino acid and and molecular mass of 25,106 Da. The complete protein, composed of five monomers, has a total mass of approximately 120,000 Da. is a member of the short pentraxin family. [2]

CRP is synthesised primarily in liver hepatocytes and smooth muscle cells, macrophages, endothelial cells, lymphopcytes and adipocytes. CRP plays important role in inflammatory processes and host responses to infections including the complement pathway, apoptosis, phagocytosis and the production of cytokines most notably Interleukins-6 (IL-6), and to a lesser degree IL-1 and tumor necrosis factor (TNF-α). The highest concentrations of CRP are found in an individual having some bacterial infections where CRP level increase up to 1,000-fold. [3]

CRP assay can improve the clinical outcomes of patient, and assist the clinicians in reducing the morbidity and mortality. Therefore, the present study was carried out as a part of M.Sc. Medical Microbiology thesis to find the correlation of the CRP with acute and chronic inflammation.

Objectives:

1. To perform and record results of Qualitative CRP test.
2. To perform semi- quantitative CRP test of qualitatively positive serum samples.
3. To study association of raised CRP levels with acute and chronic inflammatory diseases

MATERIAL AND METHODS

All blood samples were collected from clinically suspected OPD and IPD patients in plain vacutainer tubes and received in Serology laboratory of Microbiology Department Adesh Institute of Medical Sciences and Research (AIMSR) for CRP test. Covid patients were not included in the study. The study was carried out for a period of six months (October 2020 to March 2021) after getting approval from AIMSR Research Committee and Ethics Committee, Adesh University.

The blood samples were allowed to clot by leaving it undisturbed at room temperature for 15-30 minutes. The tubes were centrifuged at 3000 rpm for 5 minutes in a centrifuge. Following centrifugation t he liquid component (serum) was transferred into a clean polypropylene tube using a Pasteur pipette. [4] Specimens were maintained at 20-25°C during testing. Specimens were stored at 4-8°C for no longer than 8 days. If the samples were needed to stored for longer period they were kept at -20ºC in a deep freezer.[5] Qualitative CRP assay (Latex agglutination test) was performed by using commercially available kit and following manufacturer instructions. (Beacon Diagnostics Pvt Ltd). Presence of agglutination similar with a positive control was considered as positive C-reactive protein test i.e. Conc. of CRP greater than 6 mg/L. Semi- Quantitative CRP assay was performed for qualitatively positive samples following manufacturer instructions. (Beacon Diagnostics Pvt Ltd) The CRP levels were calculated by multiplying the maximum dilution showing visible agglutination by 6 mg/L. The results were recorded in the proforma for reporting of results which also included all the demographic and clinical details of the patients.

RESULTS

A total of 450 serum samples were received for CRP testing during a period of six months. Out of these, 50 samples were positive by Qualitative CRP test; 50 samples were positive in which 32 were males and 18 were females. Maximum CRP positivity was observed in age group of 40-60 years followed by 20- 40 years were 26%, 60-80 years were 16%, 0-20 years were 10% and >80 years were 4%. More number of CRP samples were positive (54%) in OPD patients as compared to IPD patients (46%). Out of 50 CRP positive samples maximum were from Department of Orthopedics (48%), 26% were from of Department of Medicine, 12% were from of Department OBG, 10% were from Department of Surgery and 4% were from Department of Pulmonary medicine. Maximum CRP titre (192 mg/L) was obtained in 2 samples only and minimum CRP titre of 6mg/L was also obtained in 2 samples only. Out of 50 samples 18 samples showed titre of 48mg/L. Maximum CRP raised level was found in patients with Rheumatoid arthritis (54%), followed by systemic lupus erythematosus (14%), sepsis (6%), fever (8%), cardiovascular disease (4%), diabetes mellitus (4%), sore throat (4%), acute cough (4%) and acute appendicitis (2%). On the whole, more number of CRP levels were obtained in 76% patients with chronic inflammatory diseases and 24% patients with acute inflammatory diseases.

Figure1: Qualitative LAT showing agglutination In the circles marked as 'PC' and 'T'

Figure 2: Semi-Quantitative LAT showing CRP titre of 192 mg/L (Circle 6)

Figure 3: Semi-Quantitative LAT showing CRP titre of 48 mg/L (Circle 4)

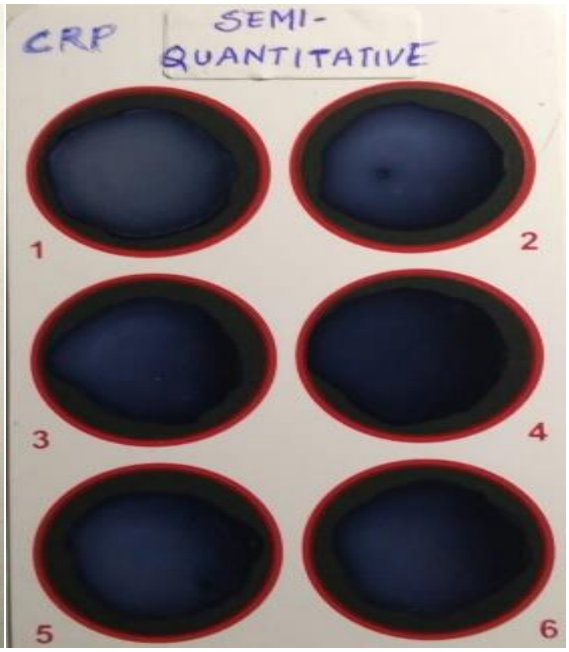

Figure 4: Semi-Quantitative LAT showing CRP titre of 6 mg/L (Circle 2)

DISCUSSION

In the present study, among 50 CRP positive patients 36% were males and 64% were females. The results of this study are similar to Lindbaek et al. (2005), Williams et al. (2005), Shrivastava et al. (2013) and Andeerva et al. (2014), in which more number of CRP positive patients were females as compared to males. [6,7,8,9]

It has been reported by the previous studies that age group most effectively affected with inflammatory diseases was 40-60 years, followed by 20-40 years suggesting that CRP positive was common in middle age groups. In the present study, raised level of CRP are detected in the age group 0f 40-60 years which is comparable with Shrivastava et al. (2013), Liu et al.(2008) and Raja et al.(2017). [8,10,11]

In the present study the CRP titre 48mg/L was obtained in maximum number of patients. The study showed similar results which are comparable to the studies reported by Lindbaek et al.(2005), Shrivastava et al.(2013) and Andveera et al.(2014). [6,8,9] However, the results are in contrary to results of Williams et al. (2005), Raja et al.(2017) and Povoa et al. (2005) [7,11,12]

The findings of this study that most patients with rheumatoid arthritis showed highly raised titres of serum CRP were similar to the study reported by Shrivastava et al.(2013) and Andveera et al.(2014). [8,9] However, results of present study vary from other studies - Lindbaek et al.(2005),Williams et al. (2005) and Cozlea et al.(2013). [6,7,13]

In the present study raised CRP levels obtained in 76% patients with chronic inflammatory diseases and 24% patients with acute inflammatory diseases. In this study, it was observed that the CRP levels are associated with both acute and chronic inflammatory diseases. Clinical history and results obtained from the patients suggest that there was a high prevalence of co-morbidities in patients with RA, the most common of which include cardiovascular disease, diabetes mellitus, pulmonary disease and autoimmune disorders. The results of present study are in concordance with results of Andveera et al.(2014), Liu et al.(2008), and Raja et al.(2017) and Tabassum et al. (2017) who have also reported more rise of CRP titre in chronic inflammatory disease. [9,10,11,14]

CONCLUSION

In the present study, it was observed that high CRP levels are associated with chronic inflammatory diseases as compared to acute inflammatory diseases and serum CRP levels can be tested using standard or high -sensitivity (hsCRP) assays. The major limitations with slide Latex agglutination test are that quantification is only possible after serial dilution of the serum & subjective variation in looking for the titre showing absence of agglutination. In conclusion, CRP is widely available, inexpensive, and an easy to obtain marker

that correlates with disease severity and mortality. Our findings support the utility of daily CRP values in patients and provide early thresholds during hospitalization that may facilitate risk stratification and prognostication.

REFERENCES

1) Iwalewa EO, McGaw LJ, Naidoo V, Eloff JN. Inflammation: the foundation of diseases and disorders. A review of phytomedicines of South Afr ican origin used to treat pain and inflammatory conditions. Afr J Biotechnol.2007;6(25):2868-2885.
2) Ciubotaru J, Potempa LA, Wande RC. Production of modified Creactive protein in U937 -derived macrophages. Exp Biol Med.2005; 230(10):762–70.
3) Mantovani A, Garlanda C, Doni A, Bottazzi B. "Pentraxins in innate immunity: from C-reactive protein to the long pentraxin PTX3". Journal of Clinical Immunology.2008;28(1):1–13.
4) Henry JB. Clinical Diagnosis and Management by Laboratory Methods, Volume 1, W.B Saunders Company, Philadelphia, PA.1999;60-8.
5) Thavasu, PW. Measuring cytokine levels in blood. Importance of anticoagulants, processing, and storage conditions. J Immunol Methods. 1992;153(1-2):115-24
6) Lindbaek M, Hoiby EA, Lermark G, Steinsholt IM and Hjortdahl P. Clinical symptoms and signs in sore throat patients with large colony variant beta haemolytic streptococci groups C or G versus group A. British Journal of General Practice. 2005;55(517):615-9.
7) Williams JR, Ralph C, Molly E. Harmon, Rufus Burlingame, Terry W. Du Clos. Studies of serum Creactive protein in Systemic lupus erythemato sus. J Rheumatol. 2005;32(3):454-61
8) Shrivastava AK, Singh HV, Raizada A, Singh SK, Pandey A, Singh N, Yadav DS, Sharma H. Inflammatory markers in patients with rheumatoid arthritis. Allergo l Immunopathol. 2013;43(1)81-7
9) Andreeva E and Melbye H. Usefulness of C-reactive protein testing in acute cough/respiratory tract infection: an open cluster-randomized clinical trial with C-reactive protein testing in the intervention group BMC Family Practice 2014;15:80.
10) Liu KT, Lin TJ, and Chan HM. Characteristics of febrile patients with normal white blood cell counts and high Creactive protein levels in an emerge ncy department. Kaohsiung J Med Sci. 2008;24(5):248-253
11) Raja MH, Elshaikh E, Williams L, Ahmed MH. The Value of C-Reactive Protein in Enchancing Diagnosis of Acute Appendicitis. Jcurr Surg.2017;7(1-2):7-10
12) Povoa P, Coelho L, Almeida E, Fernandes A, Mealha R, Moreira P, Sabino H. C-reactive protein asa marker of infection in critically ill patients. Clin Microbio l Infect. 2005;11(2):101-8.
13) Cozlea DL, Farcas DM, Nagy A, Keresztesi AA, Tifrea R, Cozlea L, Carașca DL. The Impact of C- Reactive Protein on Global Cardiovascular Risk on Patients with Coronar y Artery Disease. Current Healt h Sciences Journal. 2013,39(4):225-31.
14) Tabassum R, Mia AR, Reza-Ul-Haq KM, Yesmin M, Faruqui JM. C-reactive Protein Level in Type-2 Diabetic Patients Attending Mymen singh Medical College Hospital, Mymen singh Med J. 2017;26(1):56-60.