

## EVALUATION OF CRP LEVEL AS MONITORING TOOL FOR PATIENT WITH FACIAL SPACE INFECTION

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### ABSTRACT

**Background and Aim** Despite greatly improved health services available in present era, severe odontogenic infections still remains leading cause of morbidity and mortality. Thus close monitoring of such patients becomes a necessity and efficient monitoring tools are required for the same. The objectives to assess efficacy of CRP levels as monitoring tools for determining severity of infections, severity of malnutrition and nutritional status, length of hospital stay, and efficacy of treatment regime. **Materials & Methods:** The blood samples of the patients were taken on Day 0 and Day 5 for measuring serum levels of the markers. Simultaneously clinical parameters like swelling size, mouth opening, pain etc. were also recorded on Day 0 and Day 5. The appropriate treatment was given to each patient. Analyses were done to find correlation between markers and clinical parameters of odontogenic infections using regression and paired t- test. **Results:** The statistical analysis found strong correlation between lab values of markers and clinical parameters used to measure severity of infection. The analysis also proved that values of markers significantly changed and moved towards normal as the condition of patient improved with effective treatment. Similarly, CRP was also a significant predictor for hospital stay ( $P < 0.001$ ) and 40.11% of the variation in X hospital stay was explained by CRP. ( $P < 0.001$ ) **Conclusion:** The findings of this prospective analysis indicate C-reactive protein are effective markers for determining severity of infection, efficacy of treatment regime and length of hospital stay for patients with fascial space infections of odontogenic origin. The duration of antibiotic usage, need for intensive care, and use of additional nutritional supplements becomes more rationale if these markers are incorporated in the clinical decisions. Thus we conclude that CRP should be incorporated as monitoring tools for patients with fascial space infections.

**KEYWORDS:** CRP, Space infection, Oral infection, Serum level.

### INTRODUCTION

Orofacial infections have plagued humankind for as long as our species has existed. Most of these infections are odontogenic in origin and one of the most frequently occurring infectious processes known to both antiquity and present day health practice.<sup>[1]</sup> Bacterial infections are a major cause of morbidity and mortality. Diagnosis of bacterial infections is sometimes challenging, because clinical presentation of infections from different causative agents can be similar; for example, it may be difficult to differentiate viral from bacterial infections in certain instances. Inflammatory states, such as trauma, pancreatitis, transplant rejection, and vasculitis, might also have a clinical presentation similar to that for an

infection.<sup>[2]</sup> Although untreated bacterial infections may cause serious complications, treating viral illnesses or non infective causes of inflammation with antibiotics is not only ineffective, but also contributes to the development of resistance, increases costs, and adds the risks of toxicity and allergic reactions.<sup>[3]</sup>

Maxillofacial Infection is one of the life threatening conditions, despite greatly improved health services available in present era, severe odontogenic infections still remains leading cause of morbidity and mortality.<sup>[4]</sup> Lethal complications like upper airway obstruction, descending mediastinitis, thrombosis of jugular vein, venous septic emboli, rupture of carotid artery, adult

respiratory distress syndrome, pericarditis, septic shock and disseminated intravascular coagulopathy may become inevitable. Making vigilant scrutiny and monitoring of such patients is necessity.<sup>[5]</sup>

The conventional measures to estimate infections such as evaluation of WBC count and ESR are valuable in determining state of patient at testing time. However, the predictability of these is limited.<sup>[6]</sup> A better knowledge of the inflammatory cascade has given new insights and provided several mediators that in conjunction with the clinical manifestations can be useful as markers of infection. One such mediator is C-reactive protein (CRP) and is probably the most widely used marker.<sup>[7]</sup>

The C-reactive protein (CRP) test is used to find inflammation and infection in your body. It does this by measuring the amount of CRP in your blood. CRP is a protein made by the liver and sent into the bloodstream.<sup>[8]</sup> Blood levels may be higher when you have inflammation or an infection. Because CRP levels often go up before you have symptoms of pain or fever and drop down as you recover, the CRP test is especially useful for tracking infections.<sup>[9]</sup> Because C-reactive protein is part of the immune system, your levels of it rise whenever you have inflammation in your body. However, the test doesn't show where the inflammation is or what is causing it. A high-sensitivity CRP test (hs-CRP) may be used to measure your heart disease risk even if you seem healthy. It can find much smaller changes in CRP levels than the regular CRP test. So in the present prospective study, sincere attempt has been made to assess efficacy of CRP level as monitoring tools for patients with fascial space infections.

## MATERIALS AND METHODS

The present study was done on the 40 patients who were suffering from facial space infection. All the patients were examined and selected from the opd from the department of oral and maxillofacial surgery in the dental college. The institutional review committee was informed about the study and the ethical clearance was obtained from the patients. All the patients included in the study were informed about the study and the written informed consent form was signed by them.

The patient between the age of 15 to 50 years were included in the study. Patient who did not receive any antibiotics and those who were diagnosing with fascial space infection were included in the study. All the patients who were receiving antibiotics for recent infection, pregnant females, immunocompromised and mentally challenged patients and those who had difficulty in follow up, were excluded in the study.

Detail history was recorded. A blood sample was taken by applying tourniquet and with help of vacutainer from the anticubital vein. At every scheduled visit 2 ml of blood was drawn for the analysis of C reactive protein. Two times the blood samples were taken, D1

preoperatively that is before starting any treatment and D2 5 days post operatively after the treatment. The value of D1 was taken as the reference value and the value of D2 was taken to confirm the continuous improvement and progress of patient.

Treatment of the space facial infection was started with incision and drainage. Aim was to relieve the patient from pain and control the spread of infection. Post operative blood sample was taken on 5<sup>th</sup> day for the investigation CRP count. The evaluation of CRP was done by quantitative turbidimetry method. The cultural sensitivity of the discharge sample was done and the antibiotics were started for the control of infection. The values of 5<sup>th</sup> day was compared with those of pre operative and confirmed for the patient's improvement towards normal values.

## RESULT

Present study was conducted on the 40 patients who visited the department of oral surgery. All the patients were diagnosed with space infection. The patients were with the age range of 15 to 60 years that included majority of males and few females. The mean age in the study was found to avg. 39 years. Of the total cases included in the study, infection of mandible was observed in 32 patients and rest 8 patients had infection involving maxilla.

When culture result of the discharge sample was done, the most prevalent organism was found to streptococcus mutans. Different parameters like swelling size, pain and lab results were used to determine the severity of infection and effectiveness of the treatment regime. The recording of clinical parameter as well lab investigations were done on day 0 and day 5.

The CRP levels are significant predictor for the swelling. When the comparison of mean CRP count was done at day 0 and at day 5, the mean of CRP count on day 0 was 40.02 mg/dl and on day 5 it was 4.65 mg/dl ( $p$  value  $<0.001$ ) for all 40 cases. By using paired  $t$  test  $p$  value  $<0.05$ , it was found that there is significant difference between mean CRP count at day 0 to day 5. When the results of CRP were compared it was seen that the mean values of CRP were abnormal on day 0 and were within normal limit on day 5 in all cases.

On account of the above analysis it was found that there is strong relation between lab parameters and the clinical parameters used to measure the severity of infection. The statistics proved that the maker's value changed significantly and moved towards normal as the condition of patient improved with the effective treatment.

## DISCUSSION

Early identification of infections is still a challenge for clinicians. The general consensus is not to provide antibiotics for every suspected infection because of

emerging issues with bacterial resistance.<sup>[10]</sup> Therefore, a marker specific for bacterial infection will be most helpful. Based on this meta-analysis, we observed that PCT levels were more accurate markers for bacterial infection than were CRP levels, both when differentiating bacterial infections from noninfective causes of inflammation and when differentiating bacterial infections from viral infections.<sup>[10]</sup>

Inflammation, infection, trauma, and neoplasms may result in significant changes in plasma concentrations of acute-phase reactive proteins, including C-reactive protein, transferrin, amyloid protein A, and prealbumin.<sup>[11]</sup> The acute phase response is a complex set of systemic and metabolic reactions elicited by infections or other causes of injury. C-reactive protein is commonly used as clinical marker of infection and inflammation. CRP that is present in only small amounts in healthy individuals is involved in several processes of the unspecific immunologic defense. In severe infections or inflammatory reactions a striking rise in the serum concentration is often seen. This suggests the possibility that rise of CRP is sufficiently rapid and specific to serve as a definitive aid in the early diagnosis of septicemia. Thus based on these properties of the markers attempt has been made to use them in patients with fascial space infections.<sup>[12]</sup>

In the present study, we found that CRP had a high degree of correlation with severity of infection having  $p$  value  $<0.01$  from Day 0 to Day 5. In the similar study conducted by Pinilla et al., where they found statistically significant correlation of CRP at 2nd day ( $r = 0.45, p < 0.01$ ) and 5th day ( $r = 0.53, p < 0.01$ ) in infection patients. Similar study was conducted by Malve I on under nourished children with associated clinical infection. They found that mean serum levels of prealbumin was significantly decreased ( $p < 0.001$ ) and levels of CRP was significantly increased ( $p < 0.01$ ) when compared to healthy controls.

In the present study, CRP levels were found to be significantly high ( $p < 0.01$ ) in most of patients of space infections of odontogenic origin. We found significant decrease in the CRP value from abnormal to normal values from day 0 to day 5. The present study goes well with the above mentioned studies in the way that CRP levels decline significantly when effective treatment was given to the patient. Thus in the present study, it is seen that CRP are significant predictors for severity of infection, effectiveness of treatment regime, length of hospital stay.

## CONCLUSION

The findings of this prospective analysis indicate that C-reactive protein are effective markers for determining severity of infection, efficacy of treatment regime and length of hospital stay for patients with fascial space infections. Serum CRP reflects immediate effect of the treatment whereas prealbumin levels give further

prognostic information. The duration of antibiotic usage, need for intensive care, and use of additional nutritional supplements becomes more rationale if these measurements are incorporated in the clinical decisions. Thus the markers also help in making treatment of patients with fascial space infections of odontogenic origin more cost effective and they also help protecting patients from side effects of excess drugs usage.

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