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Study of Blood Culture Positivity and Sepsis Biomarkers in a Critical Care Unit of a Tertiary Care Hospital

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ABSTRACT

Purpose: To compare the blood culture positivity and biomarkers of sepsis from patient admitted in intensive care unit

Methods: A total number of 104 clinically diagnosed sepsis were studied over a period of 12 months and for all sampls blood culture culture and biomarker (CRP) were determined and results were compared

Results: Of the total 104clinical samples studied 48(46.1%) were culture positive. Out of these 48, 18 were Klebsiella spp, 11 staphylococcus aureus, 08 Escherichia coli, 95 coagulase negative staphylococcus aureus, 03 Pseudomonas spp, 02 acinetobacter spp and 01 candida spp.In our study where the sensitivity of CRP is 55%.

Conclusion: Biomarkers like CRP, PCT have been widely used it has its own limitation from distinguishing sepsis and inflammatory

KEYWORDS: Intensive care unit, sepsis, blood culture, C reactive protein

Introduction:

Critically ill patient suffer from sepsis, diagnosing sepsis can be challenge since clinical symptoms are not more specific and overlap with other inflammatory conditions. Blood culture is gold standard are frequently used specimen for detecting sepsis but lacks sensitivity and specificity at the same time reliability of culture decreases in case of prior antimicrobial therapy. Almost half of the positive samples do not show proper reliable isolates(1). An ideal biomarker should establish early diagnosis, course, prognosis and therapeutic decision of the disease. Sepsis biomarker may be related to vascular endothelial damage, vasodilatation, chemokines, cell markers, receptors, coagulation factors and acute phase proteins(C reactive protein (CRP), procalcitonin, ceruloplasmin).The exact role of biomarkers in the management of sepsis patient remains undefined. Acute phase proteins like CRP have been used for many years but lacks specificity (2). However PCT is more specific and better prognostic marker than CRP, with this background the present study was undertaken to investigate etiology of blood stream infection by blood culture and CRP(3) (4)

Materials and methods:

The present study carried out for period of 12 months in Department of Microbiology, tertiary care hospital, Chennai. A total of 104 clinically diagnosed cases of sepsis were included in the study. To identify the etiologic agent blood culture were done on admission. About 5-10ml of blood was collected aseptically and was inoculated onto 50-100ml of brain heart infusion broth to attain a 1:10 dilution. The cultures bottles were inoculated at 37 C aerobically for 7 days. Subcultures were made onto blood agar and Macconkey agar after 48hours, 5 days and 7 days from the inoculated broth. If there was any growth it was identified by usual procedure like motility, grams staining, biochemical reaction and enzyme detection. (5)

CRP was estimated by latex agglutination method with CRP Kit (Beakon Diagnostics).CRP value of more than 6 mg/dl was taken as significant value. Titer was estimated by serial dilution method.CRP estimation was repeated to assess prognosis. (6)

Results:

A total of 104 clinical samples were collected from various ICU in our hospital and processed for isolation and identification of causative organism.Of the 104 isolates 48(46.1%) were culture positive. Out of these 48, 18 were Klebsiella spp, 11 staphylococcus aureus, 08 Escherichia coli, 95 coagulase negative staphylococcus aureus, 03 Pseudomonas spp, 02 acinetobacter spp and 01 candida spp. (Table 1)

Table 1: Shows breakup of organism (n=48)

Organism	No. Of isolates	Percentage (%)
Klebsiella	18	37.5
Staphylococcus aureus	11	22.9
Escherichia coli	08	16.6
Coagulase negative staphlococci	05	10.4
Pseudomonas	03	6.2
Acinetobacter	03	4.1
Candida	01	2

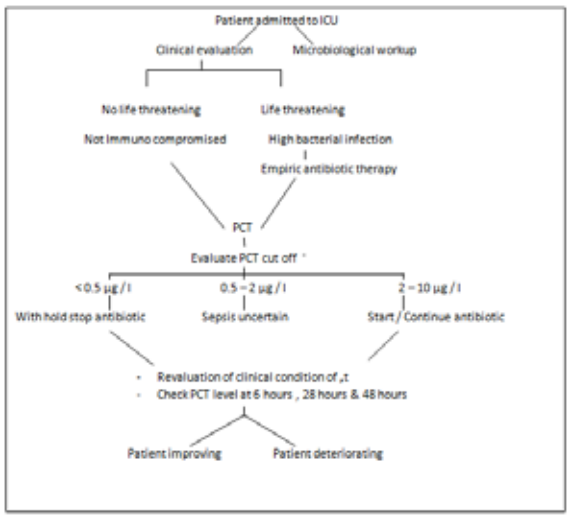
All the blood culture samples were subjected to estimation of CRP. Most of the samples which are negative by blood culture did not show any significant rise of CRP

Discussion:

Sepsis is a clinical syndrome associated with mortality and morbidity, blood culture is valuable tool to identify the etiological agent in sepsis, but it is less sensitive because of prior administration of antibiotics, presence of slow growing and fastidious organism. (7) In fact blood cultures are positive only in 20-40% cases of severe sepsis. In our study the most common organism isolated is klebsiella followed by staphylococcus aureus which correlates with study done by Battacharyya et al. Coagulase negative staphylococci previously considered as containment are now been recognized as a causative agent in blood stream infection.

Clinically used biomarkers are CRP, PCT and endotoxin activity assay. Tissue damage can induce acute phase response and acute phase protein as a marker of infection. Study by Charalampos in 2010 the five biomarkers (IL12, IP10, PLA2, CD64, CD11b) used for early diagnosis of sepsis shows sensitivity and specificity of more than 90%.Some biomarkers is used to predict the development of multiple organ failure and to evaluate response to therapy. In our study biomarker used to assess the degree of sepsis is CRP.CRP greater than 10 mg/dl may indicate infection. (8) Indian study in 2008 shows sensitivity of CRP is 60.9% which correlates with our study where the sensitivity of CRP is 55%. Food drug administration approved the use of PCT quantitative assay where the level increases >1000ng/ml in severe sepsis because of cost effective it is not done in our study. Clinically PCT is used to improve diagnosis, guidance of antibiotic therapy and even prognostic marker. (9) No biomarker is used clinically in day to day practice because of its own limitation so it is better to combine several biomarkers which need further study. The strength of our study is that only blood isolates were analyzed as samples from other sites may represent colonization and may not require therapy. (10)

Approach for diagnosis of sepsis in critically ill patient in ICU Patient admitted to ICU



Conclusion:-

Biomarkers like CRP, PCT have been widely used but it has its own limitation from distinguishing sepsis and inflammatory condition

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