

**PROCALCITONIN IN DIAGNOSIS
OF INFECTION AND ITS
COMPARISON WITH OTHER
BIO- MARKER IN CRITICALLY
ILL PATIENT- A STUDY IN
UNITED HOSPITAL LIMITED.**

Dr. Afsana Begum
Associate Consultant
United Hospital Limited

INTRODUCTION

- ⦿ Sepsis is systemic inflammatory response syndrome (SIRS), due to bacterial infection
- ⦿ This condition requires prompt institution of antibiotic therapy.
- ⦿ On the other hand, indiscriminate use of antibiotics in critically ill patients with SIRS due to other causes lead to overuse of antibiotic with risk of rise in antibiotic resistance.

- ⦿ Search for a biomarker for sepsis which is highly specific and sensitive with the minimum turnaround time.
- ⦿ Can reliably distinguish between bacterial infection from other infections, such as, viral, fungal, or protozoal infections as well as non-infectious causes of SIRs.

FEATURES:

- ◉ Objective parameter
- ◉ Easy to use and interpret
- ◉ Reproducible
- ◉ Readily available
- ◉ High sensitivity and specificity
- ◉ Should show rapid increase and decrease
- ◉ Should show appropriate response with effective therapy
- ◉ Should co-relate with disease severity
- ◉ Should show sustained rise in any subsequent infection
- ◉ Inexpensive

HISTORY AND PHYSIOLOGY

- First mention in sepsis in a report of 1983.
- Elevated levels in toxic shock syndrome (TSS) caused by *Staphylococcus aureus*.
- Assicot et al in 1993 first described PCT as a new marker for infection.
- PCT is a 116 amino acid long peptide having a molecular weight of 13 KDa.

- It is a precursor of calcitonin, produced by the C-cells of thyroid under the control of the calcitonin gene related peptide 1 (CALC-1) gene.
- Normally, the expression of the gene is found in the neuroendocrine cells of the thyroid and the lung.
- However, during microbial infections there is increased CALC-1 gene expression in various extra-thyroid tissues and cells including kidneys, liver, pancreas, leucocytes, and adipose tissue with concomitant release of PCT throughout the body.

- The normal physiological level of PCT in serum is less than 0.1 ng/mL which can increase several folds in systemic bacterial infections.

PATHOPHYSIOLOGY OF PROCALCITONIN IN SEPSIS

- ◉ In inflammation, the release of PCT two way process: direct and indirect.
- ◉ The toxins and lipopolysaccharides released by microbes can induce the release of PCT in a direct manner; or
- ◉ Alternately the inflammatory cytokines like interleukin (IL) 1b, IL-6, tumour necrosis factor(TNF) etc may indirectly influence PCT production.

LEVEL OF PROCALCITININ

| Reference Value(ng/ml) | Interpretation |
|-------------------------|----------------------------------------------------------------------|
| <0.05 | Normal |
| <0.5 | Localised infection possible. Retest after 6-24 hrs. |
| >0.5-<2 | Systemic bacterial infection possible. Re-test after 6-24 hours. |
| >2-<10 | Systemic bacterial infection is likely. High risk for severe sepsis. |
| >10 | Severe bacterial sepsis. Septic shock |

OBJECTIVE:

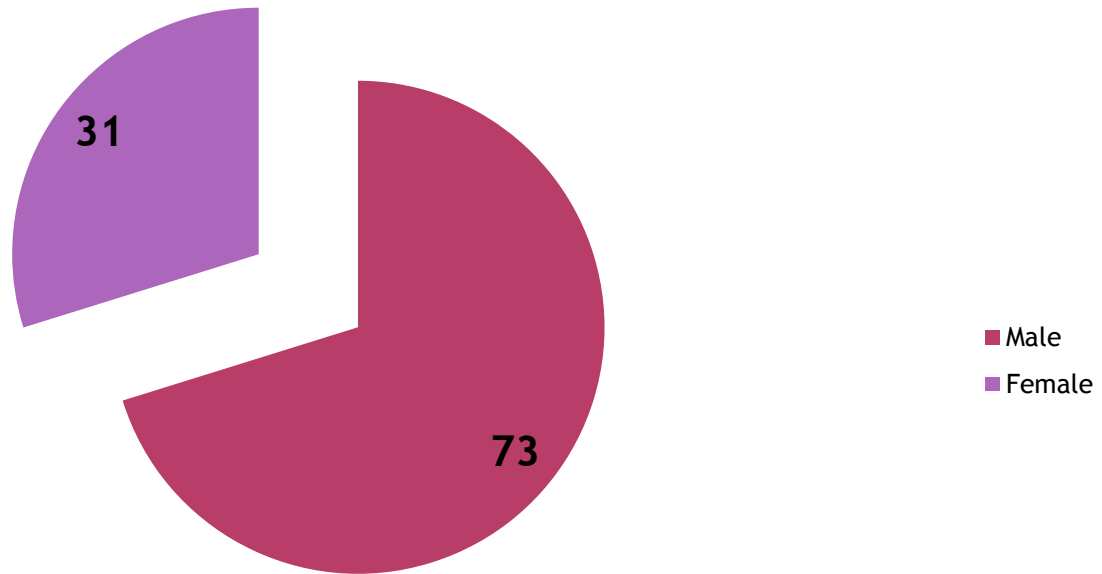
To compare the sensitivity of procalcitonin with other biomarker as a effective biomarker in diagnosis of bacterial infection.

METHOD:

- It is a cross sectional study done in United Hospital Limited.
- The study period is from Jan 2013- Dec 2013.
- Patients admitted in GICU, HDU, CCU with sepsis were included.

- Total number of patients were 104. Among them 73 were male and 31 were female.
- The sensitivity of Procalcitonin was compared with CRP, ESR, WBC, Neutrophil count. In 90 cases procalcitonin was elevated.
- The sensitivity is 86.53% .
- Neutrophil showed more sensitivity than ESR.

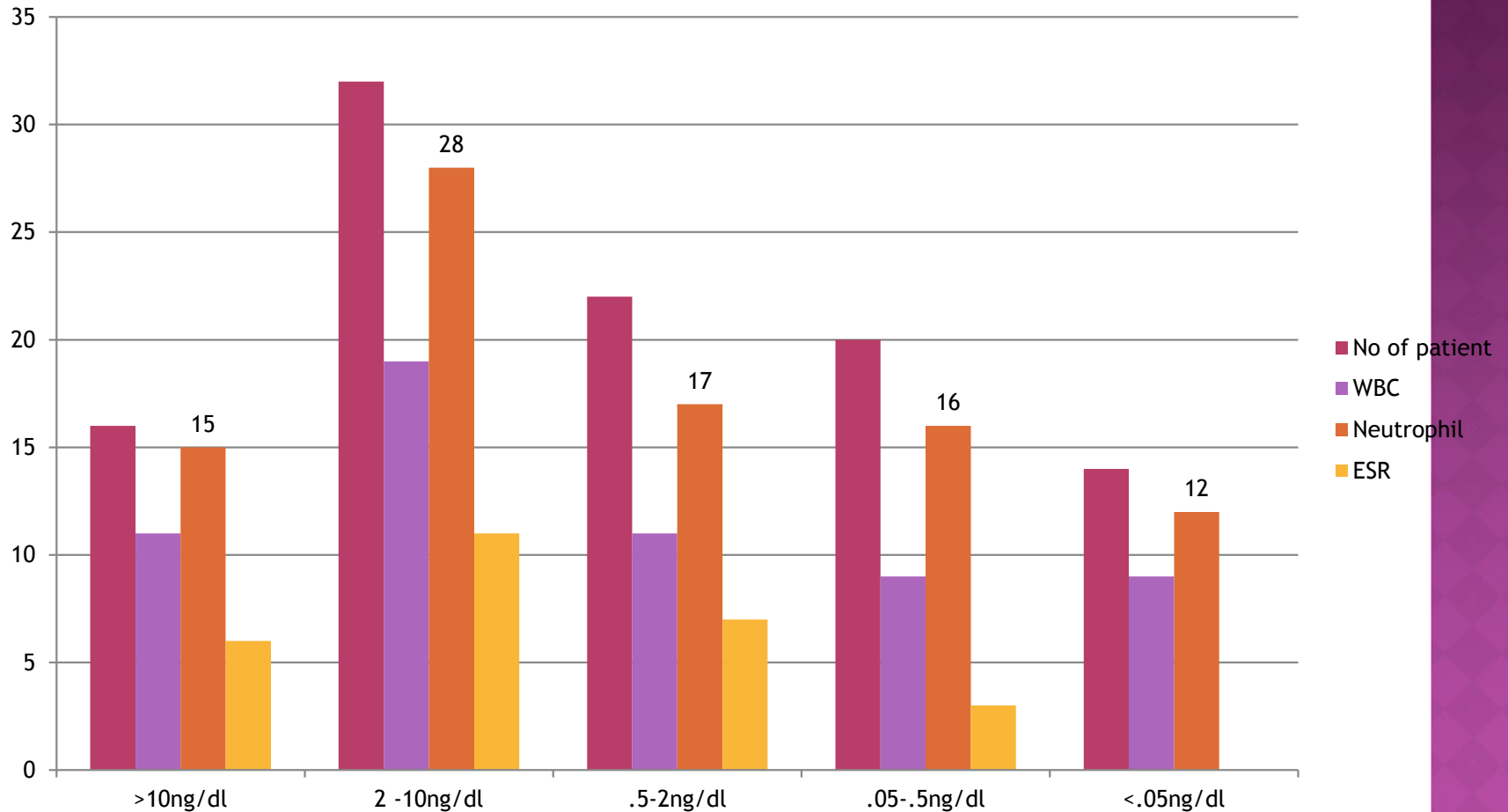
Male :Female



NUMBER OF PATIENT CORRELATE WITH OTHER INFLAMMATORY MARKER

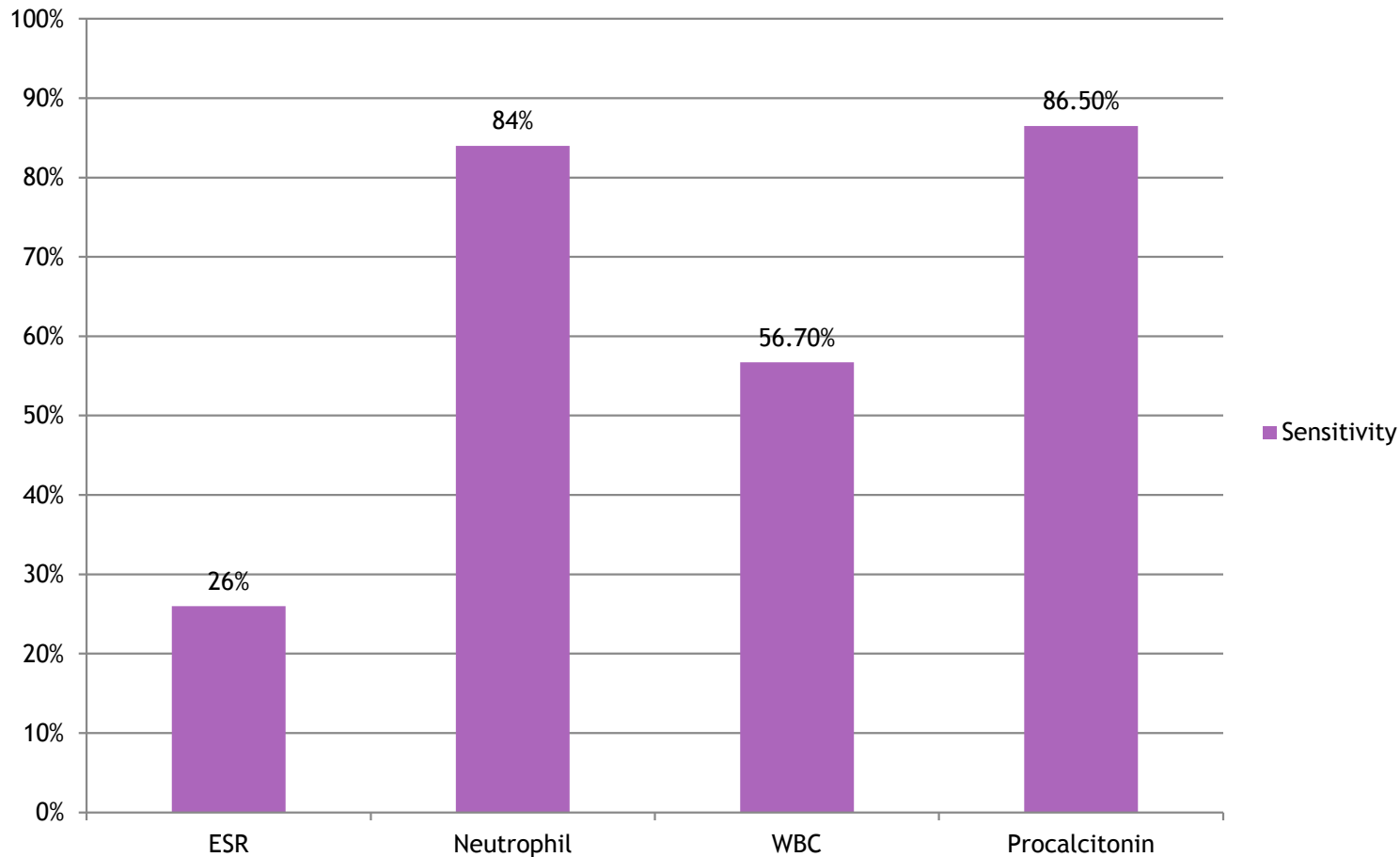
| Procalcitonin | No of patient | WBC | Neutrophil | ESR |
|---------------|---------------|-----|------------|-----|
| >10ng/dl | 16 | 11 | 15 | 6 |
| 2 -10ng/dl | 32 | 19 | 28 | 11 |
| .5-2ng/dl | 22 | 11 | 17 | 7 |
| .05-.5ng/dl | 20 | 9 | 16 | 3 |
| <.05ng/dl | 14 | 9 | 12 | 0 |

RELATION OF PROCALCITONIN WITH OTHER INFLAMMATORY MARKER



COMPARISON OF SENSITIVITY OF DIFFERENT BIOMARKER

Sensitivity



SENSITIVITY OF BIOMARKERS:

| Biomarker | Sensitivity |
|---------------|-------------|
| ESR | 26% |
| Neutrophil | 84% |
| WBC | 56.7% |
| Procalcitonin | 86.5% |

CRP VS PROCALCITININ

- Evaluated only in 23 cases.
- Sensitivity is 95% .

- The most recent meta-analysis evaluating 30 studies with 3244 patients yielded a sensitivity of 77% (95% confidence interval (CI): 72-81%) and specificity of 79% (CI: 74-84%) indicating that it was a useful biomarker for diagnosis of early sepsis.

- Published evidence suggests that PCT appears to have a distinct advantage over CRP in diagnosis of sepsis. However, clinicians regard it as a relatively non-specific marker of inflammation.
- This is reflected by the recommendations of American College of Critical Care Medicine (ACCM) and the Infectious Diseases Society of America (IDSA).

- The ACCM and IDSA have graded PCT as a level 2 evidence (reasonably justifiable by available scientific evidence and strongly supported by expert critical care opinion)
- Recommended that PCT can be used as an adjunctive diagnostic tool for discriminating infection as the cause for fever or sepsis presentation while evaluating new fever in critically ill patients.

CONCLUSION

- Procalcitonin thus, appears to be promising as a biomarker for diagnosis and prognosis of moderate to severe bacterial infections and as a guide for antibiotic therapy.
- Further studies in field-conditions from tropical countries may help in establishing PCT as a point-of-care diagnostic test.

Thank You