STUDY ON DIAGNOSTIC VALUE OF SERUM AMYLOID A PROTEIN (SAA) DURING LATE-ONSET SEPSIS IN PRETERM AND FULL TERM NEONATES

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ABSTRACT

Late-onset sepsis (LOS) is a major problem in the NICU associated with high morbidity and mortality.

The study aimed to asses the diagnostic value of serum amyloid A protein (SAA) during late-onset sepsis in preterm and full term neonates.

In this study, the level of SAA was measured in the serum of neonates with LOS presented after the 7^{th} day to the NICU (cases) and was compared with the level of SAA in healthy neonates (controls) and compared with other tests usually used to diagnose sepsis in NICUs (TLC, CRP, I:T ratio and platelets count). SAA level was significantly higher in the cases than its level in the controls , and continued to be elevated after initiation of treatment by 48-72 hours in the cases compared to controls. The level of SAA in the Gram negative group was significantly elevated than the level of SAA in the Gram positive group.

SAA level was significantly elevated in septic neonates who were preterms, those with low birth weight and those with low Apgar score due to increase incidence of sepsis in these groups.

Comparing SAA data to the tested other markers of sepsis including CRP, TLC, I: T ratio and platelets count, it was found that SAA was the most sensitive (86%). As regarding specificity, SAA was most specific than CRP, TLC and PLT, but less in specificity than I: T ratio (100%).

The SAA protein level in the non survivors showed a high significant elevation compared to the discharged.

There was a highly significant positive correlation between SAA and each of CRP and I: T ratio, a significant negative correlation between SAA and PLT count, and a non significant positive correlation was observed between SAA and TLC in the cases. Also SAA protein showed highly significant positive correlation with BUN and creatinine in the same group.

In conclusion: The SAA protein could be used as an accurate marker in diagnosis of late onset neonatal sepsis, the level of SAA in the Gram negative group was significantly elevated than its level in the Gram positive group and in the non survivors more than in the improved cases. SAA was the most sensitive marker in comparison with CRP, TLC, I: T ratio and platelets count in diagnosis of late onset sepsis, its specificity was high in comparison with CRP, TLC, and platelets count but lower than that of I: T ratio.

Key words: Neonatal sepsis, SAA, NICU.

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List of abbreviations

ANC	Absolute netrophilic count
Apo-A	Apolipoprotein-A
Apo-B	Apolipoprotein- B
AT III	Antithrombin III
BPD	Bronchopulmonary dysplasia
BSIs	Blood stream infections
BUN	Blood urea nitrogen
CBC	Complete blood count
CMV	Cytomegalovirus
CONS	Coagulase-negative staphylococci
CRBSI	Catheter–related bloodstream infection
CRP	C- reactive protein
CSF	Cerebrospinal fluid
CT	Computed tomography
DFA	Direct fluorescent assay
EOS	Early onset sepsis
ESBL	Extended spectrum beta-lactamase
ESR	Erythrocyte sedemintation rate
ETA	EndoTracheal aspirate
GA	Gestational age
GBS	Group beta streptococci
G-CSF	Granulocyte colony- stimulating factor

GIT	Gastrointestinal tract
GM-CSF	Granulocyte-macrophage colony-stimulating factor
HB	Hemoglobin
HCT	Hematocrite
HDL	High-density lipoprotein
HSS	Hematological scoring system
HSV	Herpes simplex virus
Ig	Immunoglobulin
I: T	Immature to total cells
IVH	Intraventricular hemorrhage
IL	Interlukin
I[alpha] Ip	Inter-alpha inhibitor protein
IFN- γ	Interferon-[gamma]
IVIG	Intravenous immunoglobulin
K	Potassium
LBP	Lipopolysaccharide-binding protein
LP-a	lipoprotein-a
LP	Lumbar puncture
LOS	Late onset sepsis
MRSA	Methicillin resistance staph aeureus
MAC	Membrane attack complex
NA	Sodium

NICHD	National Institute of Child Health and Human Development
NICU	Neonatal intensive care unit
NEC	Necrotizing enterocolitis
NK	Natural killer
NNPD	National Neonatal Perinatal Database
NPV	Negative predictive value
PC	Protein C
PCR	Polymerase Chain reaction
PCT	Procalcitonin
PDA	Patent ductus arteriosus
PGE	Prostaglandin E
PGE2	prostaglandinE2
PIH	Pregnancy induced hypertention
PLT	Platelets
PMNs	Polymorphonuclear leukocytes
PPV	Positive predictive value
PROM	Premature rupture of membranes
RBS	Random blood sugare
RDS	Respiratory distress syndrom
ROC	Receiver-operating characteristic
RSV	Respiratory syncytial virus
SAA	Serum Amyloid A
SGA	Small for gestational age
TC	Total cholesterol

TEE	Total energy expenditure
TG	Triglyceride
TLC	Total leukocytic count
TNF-α	Tumor necrosis factor-α
TPN	Total parentral nutrition
UTI	Urinary tract infection
VLBW	Very low birth weight
VLONS	Very late onset neonatal sepsis
WBC	White blood cells

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INTRODUCTION AND AIM OF WORK

INTRODUCTION

Late-onset sepsis (LOS) is sepsis that occurs after the first week of life, it is common in the low birth weight (LBW) and preterm neonates, so it is a major problem in the Neonatal Intensive Care Unit (NICU) associated with high morbidity and mortality ***(Gonzalez et al., 2003).***

Sepsis is caused by many pathogens, which have no specific disease pattern ***(Jiang et al., 2004).***

Clinically, sepsis has many non-specific signs and symptoms due to disturbed hemodynamic and metabolic functions such as pallor, poor skin perfusion, increased incidence of apnea and / or bradycardia, hypotension, respiratory dysfunction, lethargy, and hypothermia ***(Arnon et al., 2004).***

Diagnosis of sepsis is constellated by identification of the related signs and symptoms aided by laboratory findings such as the ratio of immature to total neutrophils exceeding 0.2, leucocytosis, thrombocytopenia, and a Septic screening includes blood cultures, cerebrospinal fluid analysis and culture, and urine culture which are performed for infants at risk of sepsis in order to administer antibiotics depending on bacterial culture ***(Arnon et al., 2004 and Golden et al., 2005).***

Many inflammatory markers such as C- reactive protein (CRP) Tumor Necrosis Factor Alpha (TNF-α), and Interleukin One (IL- 1), were used for the early identification of sepsis. However, they have short plasma half- life and their specificity and sensitivity were low when assessed in the course of sepsis ***(Kuster et al., 1998).***

Serum Amyloid A protein (SAA) is acute phase reactant. It is a multifactorial apolipoprotein produced in large amounts during the acute phase of inflammation mainly in the liver ***(Zhang et al., 2005).***

It is claimed to be present early in the course of sepsis and continues longer than other acute phase reactants. It also could provide additional informations on the severity of the acute infection being the latest marker to disappear ***(Huttument et al., 2003 and Arnon et al., 2004).***

This study is to evaluate the role of (SAA) protein in diagnosis of late onset sepsis in neonates ***(Pizzini et al., 2000).***

AIM OF WORK

The present study was conducted to:

- Investigate if the serum Amyloid A protein could be used in diagnosis of late onset sepsis.
- Investigate the relationship between serum Amyloid A protein and type of organism (Gram negative group and Gram positive group), the relationship between serum Amyloid A protein level and other indicators of sepsis, other laboratory finding and outcome of cases.
- Assess the diagnostic value of serum Amyloid A protein during late – onset sepsis in preterm and full term neonates in comparison with the commonly used markers as total leucocytic count, immature to total ratio, C -reactive protein and platelets count.
- Assess the level of SAA in the cases that not survived and if SAA could be used as a prognostic marker.