Prognostic Value of Serum albumin Level in Hospitalized Patients with Community Acquired Pneumonia

Thesis

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List of Abbreviations

Abb.	Meaning
ACIP	Advisory Committee on Immunization Practices
AECB	Acute excerbation of chronic bronchitis
ATS	American Thoracic Society
BAL	bronchoalveolar lavage
CAP	community-acquired pneumonia
COPD	chronic obstructive pulmonary disease
CPK	creatine phosphokinase
CRP	C-reactive protein
CT	computed tomography
DBP	Diastolic blood pressure
DFA	direct fluorescent antibody
DRSP	drug-resistant S. pneumoniae
ED	emergency department
ESR	Erthrocyte sedimentation rate
FBG	Fasting blood glucose
FNA	fine-needle aspiration
HS-CRP	High sensitive C-reactive protein
IgG	immunoglobulin G
IgM	immunoglobulin M
LRTIs	Lower respiratory tract infections
PCT	procalcitonin
PSI	pneumonia severity Index

List of Abbreviations (Cont...)

Abb.	Meaning
RR.....	Respiratory rate
SBP	Systolic blood pressure
ST. Prot.....	Serum total protein
TLC	Total leukocyte count
TTA	Transtracheal aspiration

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INTRODUCTION

Community – acquired pneumonia (CAP) is a serious illness, the commonest infectious cause of death and the 6th leading cause of death among diseases. Up to 40% of adults with CAP require hospital admission, hospital mortality varies between 5% and 12%. Mortality is up to 50% in those admitted in ICU.CAP managed in the community has a Mortality of 1% in outpatient clinics **(Chalmers, et al., 2008).**

The pneumonia patients outcome Research team score was, Established by the American Thoracic society, this scoring system is called the pneumonia severity Index (PSI) and is the recommended severity scoring system for CAP. More simple severity scores for CAP, such as CURB-65, have also been documented **(Lee et al., 2011).** CURB-65 is a five-point scoring system for CAP, Recommended by the British thoracic society, and includes confusion, Urea >7 mmol/L (20mg/dL) respiratory rate≥ 30 breaths per minute, low blood pressure, and age≥ 65 years **(Lim et al., 2003).** However, these scoring systems may be affected by subjectivity on the part of the individual clinician for example, it is often difficult for clinicians to evaluate the mental status of patients with CAP who have dementia or those of advanced age, so the severity score may vary from clinician to clinician **(Muller et al., 2007).**

Certain serum biomarkers have been reported to predict mortality and to indicate the severity of CAP, such as serum albumin **(Nicholson et al., 2000).**

Albumin is the most abundant serum protein produced by the liver, serum albumin plays an important role in maintaining physiological homeostasis including maintenance of normal colloid osmotic pressure and transport of endogenous compound. In clinical practice, the serum level of albumin continues to serve as an important marker for the presence, progress and improvement of many inflammatory disease such as pneumonia **(Raz et al., 2003).**

We hypothesized that lower serum albumin level is common in critically ill patients with CAP and be correlated with mortality or severity of CAP.

AIM OF THE WORK

To study prognostic value of serum albumin level in hospitalized patients with community- acquired pneumonia .

Chapter (1)

COMMUNITY ACQUIRED PNEUMONIA

Pneumonia: Is an inflammatory condition of the lung, especially affecting the microscopic air sacs (alveoli), associated with fever, chest symptoms, and a lack of air space (consolidation) on a chest X-ray**(McLuckie, 2009).**Pneumonia is typically caused by an infection, but there are a number of other causes. Infectious agents include: bacteria, viruses, fungi, and parasites **(Cunha, 2010).**

Pathology and pathogenesis of pneumonia: Pneumonia is predisposed by any condition that reduces or suppresses the cough, impairs mucociliary activity, reduces the effective phagocyte activity of alveolar macrophages and neutrophils, and impairs immunoglobulin production **(Falguera et al., 2005).**Bacteria may invade the lower respiratory tract by micro or bolus-aspiration of oropharyngeal organisms, inhalation of aerosols containing bacteria, or, less frequently, by hematogenous spread from a distant body site. Bacterial translocation from the gastrointestinal tract had been hypothesized as a mechanism for infection; however, its occurrence in patients with health-care-associated pneumonia has not been shown Of the common routes, micro-aspiration is believed to be the most important for both hospital acquired and community-acquired pneumonia. In studies using radioisotope

tracers, 45% of healthy adults were found to aspirate during sleep **(Jackson et al., 2004**)Persons with abnormal swallowing, such as those who have depressed consciousness, respiratory tract instrumentation and/or mechanically assisted ventilation, gastrointestinal tract instrumentation or diseases, or who have just undergone surgery, especially thoracic and/or abdominal surgery, are particularly likely to aspirate. Pneumonia frequently starts as an upper respiratory tract infection that moves into the lower respiratory tract **(Ranganathan and Sonnappa, 2009).**

Viral:

Viruses may reach the lung by a number of different routes. Respiratory syncytial virus is typically contracted when people touch contaminated objects and then they touch their eyes or nose. Other viral infections occur when contaminated airborne droplets are inhaled through the mouth or nose **(Nair GB and Niederman, 2011).**Once in the upper away the viruses may make their way in the lungs, where they invade the cells lining the airways, alveoli, or lung parenchyma. Some viral infections such as measles and herpes simplex may reach the lungs via the blood. The invasion of the lungs may lead to varying degrees of cell death **(*Sahah BA* et al., 2010).**When the immune system responds to the infection, even more lung damage may occur. White blood cells, mainly mononuclear cells, primarily generate the inflammation **(*Singanayagam A et al.*, 2009).** As well as damaging the

lungs, many viruses simultaneously affect other organs and thus disrupt other body functions.

Viruses also make the body more susceptible to bacterial infections; in this way bacterial pneumonia can arise as a co-morbid condition **(Figueiredo, 2009).**

Bacterial:

Most bacteria enter the lungs via small aspirations of organisms residing in the throat or nose. Half of normal people have these small aspirations during sleep **(Galetto-Lacour et al., 2013).** While the throat always contains bacteria, potentially infectious ones reside there only at certain times and under certain conditions. A minority of types of bacteria such as Mycobacterium tuberculosis and Legionella pneumophila reach the lungs via contaminated airborne droplets**.** Bacteria can spread also via the blood. Once in the lungs, bacteria may invade the spaces between cells and between alveoli, where the macrophages and neutrophils (defensive white blood cells) attempt to inactivate the bacteria **(Hammer et al., 2010).**

The neutrophils also release cytokines, causing a general activation of the immune system. This leads to the fever, chills, and fatigue common in bacterial pneumonia. The neutrophils, bacteria and fluid from surrounding blood vessels fill the alveoli resulting in the consolidation seen on chest X-ray**(Kumar and Vinay, 2010)**

Pneumonia fills the lung's alveoli with fluid, hindering oxygenation. Histological Findings: Lung sections with typical bacterial pneumonias show the progression from red hepatization to white hepatization during the resolution process. The lung is repaired after bacterial pneumonia is complete and the infectious process resolves **(Fishbane et al., 2007).**

Modes of transmission:

1- Inhalation: of small airborne infectious particles (airborne transmission). Most microorganisms that cause pneumonia are able to survive on airborne droplets. These droplets can float in the air for quite a long time and if still infectious can sometimes cause pneumonia **(Chan et al., 2001).**

2-Aspiration: of resident naso-oropharyngeal flora or large airborne particles after deposition in the naso-oropharynx (aspiration pneumonia). Usually aspiration of material into the lungs occurs during sleep. Certain people aspirate more than others during sleep and as a result have more problems with lower respiratory tract infections. Other groups of people bothered by aspiration related lower respiratory tract infections are alcohol abusers, drug abusers, and comatose patients **(Cunha, 2005).**

3-Hematogenous spread to the lung from another site of infection. People with endocarditis, septic pelvic or jugular

thrombophlebitis may also experience lower respiratory tract infections (LRTIs). Pneumonia acquired by hematogenous spread to the lungs, often times is bilateral and uniform. Pneumonia transmitted by bronchogenic infection (inhalation, aspiration) is usually unilateral and tend to localize in the lung **(Boersma et al., 2006).**

4-Direct extension from a contiguous site of infection. Entamoeba histolytica can cause pneumonia by direct extension from an amebic abscess in the liver. Influenza and Respiratory syncytial viruses can spread from the upper respiratory tract to the LRT via infection of the respiratory epithelium **(Raafat, 2002).**

5-Exogenous penetration and contamination of the lung can occur due to accidental trauma (car accident) or surgery. Inhalation and aspiration are the two most common means of acquiring an infectious pneumonia **(Cunha, 2006).**

Community-acquired:

Community-acquired pneumonia (CAP) is infectious pneumonia in a person who has not recently been hospitalized. CAP is the most common type of pneumonia. The most common causes of CAP vary depending on a person's age, but they include Streptococcus pneumoniae, viruses, the atypical bacteria, and Haemophilus influenza. Overall, Streptococcus pneumonia is the