Impact of C- reactive protein and Body Mass Index on patient Outcome in respiratory ICU in Abbasia Chest Hospital

Thesis

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List of Abbreviations

6MWD	6 minute walk distance
ACTH	Adreno-corticotrophic hormone
AgRP	Agouti related peptide
APPs	Acute phase proteins
APR	Acute phase reactants
ARDS	Acute respiratory distress syndrome
BMI	body mass index
C1q	complement component
CAP	Community acquired pneumonia
CBC	Complete blood count
ChoP	choline phosphate
COPD	Chronic obstructive pulmonary disease
CPAP	Continous positive airway pressure
CRP	c- reactive protien
Da	Dalton
DM	Diabetes mellitus
DPPC	dipalmitoyl phosphatidylcholine
DVT	Deep venous thrombosis

DXA	Dual energy x ray absorptiometry
ESR	Erythrocyte sedimentation rate
ERV	Expiratory reserve volume
FEV_1	Forced expiratory volume in one second
FRC	Functional residual capacity
FVC	Forced vital capacity
GERD	Gastro esophageal reflux disease
HIV	Human immunodeficiency virus
HS	Highly significant
IL-1	Interleukin 1
IL-11	Interleukin 11
IL-6	Interleukin 6
IL-8	Interleukin 8
LL-37	The Human Antimicrobial Peptide LL-
LH	Lateral hypothalamus
LOS	Length of hospital stay
MV	Mechanical ventilation
MVV	Maximal ventilatory volume
NIV	Non invasive ventilation
NPY	Neuro peptide Y
NS	Non significant
OHS	Obesity hypoventilation

	syndrome
OSA	Obstructive sleep apnea
OSAHS	Obstructive sleep apnea hypopnea syndrome
$PaCO_2$	partial pressure of carbon dioxide in the arterial blood
PaO_2	Partial Pressure of Oxygen in Arterial Blood
PAF	Platelet activating factor
PEEP	Positive end expiratory pressure
POMC	Pro-opio melanocortin
P-value	Level of significance
RICU	Respiratory intensive care unit
rPAF	receptor for platelet-activating factor
RV	Residual volume
S	Significant
SD	Standard deviation
TNF	tumour necrosis factor
TLC	Total lung capacity
VAP	Ventilator associated pneumonia
VC	Vital capacity
VMH	Ventromedial hypothalamus
Vd	Volume of distribution
WHO	World health organisation

Introduction

Critically ill patients are responsible for 10-25% global hospital costs. (***Barrera et al, 2001)***

A number of inflammatory cells and mediators involved in the inflammatory response have been assessed for their role as potential markers of the presence and severity of the inflammatory response and organ failure***.(Pinsky et al, 1993)***

Serum CRP level began to be used as a diagnostic tool useful in determining the degree of activity, and as a therapeutic guide of a number of conditions that commonly lead to substantial changes in the plasma concentrations of acute phase proteins. ***(Pepys and Hirschfield, 2003)***

Plasma CRP is an acute phase-protein synthesized only by the liver largely under transcriptional control of IL-6, CRP levels rise rapidly in response to several inflammatory stimuli, bacterial infection being one of the most potent. The secretion of CRP begins within 4–6 hours of the stimulus, doubling every 8 hours, and peaking at 36–50 hours. After the disappearance of or removal of the stimulus, the CRP concentration decreases rapidly with a half-life of 19 hrs **(*Povoa, 2002)***

When the stimulus for increased production completely ceases, the circulating CRP concentration falls rapidly, at almost the rate of plasma CRP clearance. These characteristics of quick rise and decrease make this parameter an interesting one in the evaluation of response to therapy and prediction of outcome. ***(Lauritzen et al., 2003)***

As obesity is such a pervasive disorder in our society, and because obesity is an important risk factor for many diseases, it is not surprising that many obese patients are treated in the ICU. ***(Marik et al, 1998)***

Obesity has been associated with an increased risk for diabetes, cardiovascular and pulmonary diseases and an increased risk of death associated with these disorders. Additionally, obese patients have more frequent hospitalizations because obesity is associated with the progression of many underlying disorders. (***Peake et al, 2006)***

Problems in obese patients in the intensive care unit (ICU) may include difficulties with airway maintenance, disordered ventilation and gas exchange, impaired circulation and altered drug pharmacokinetics. Procedures are more challenging, whether non-operative (e.g. airway intubation, vascular access, neural

blocks, urinary catheterization) or operative. Safe transport, repositioning, image acquisition and mobilization can be major challenges requiring careful planning and execution. **(*Terris et al, 1996***)

Although body weight that exceeds ideal standards as determined by age, sex, and height may be accounted for by a greater muscle mass or bone mass, most individuals who weigh >20% over their calculated ideal body weight have excessive adipose mass. Body mass index (BMI) has become a widely used tool for identifying overweight and obese individuals***.(marik et al, 1998)***

Aim of the Work

The aim of our study is to evaluate the impact of C - reactive protein and body mass index on patient outcome admitted in respiratory intensive care unit (RICU) in Abbasia chest hospital.

C - reactive protein

Definition:

Human serum CRP is a cyclic pentameric protein of five identical non-glycosylated subunits of 206 amino acids, each with a molecular mass of 24 kDa, that are non-covalently bound to form the mature CRP molecule.***(Gewurz et al.,1995)***

An acute phase protein has been defined as one whose plasma concentration increases (positive acute phase proteins) or decreases (negative acute phase proteins) by at least 25 percent during inflammatory disorders. ***(Morley and Kushner, 1982)***

Biosynthesis and Regulation:

Serum CRP is synthesized by hepatocytes in the liver as a single-chain precursor with a cleavable signal sequence at the N terminus. ***(Tucci et al., 1983)***

In addition to synthesis by hepatocytes to generate serum CRP, this protein is also expressed on the epithelial surface of the human respiratory tract. ***(Gould and Weiser, 2001)***

CRP was initially thought to be produced and secreted only by hepatocytes under induction primarily by interleukin-6 (IL-6), with a synergistic effect of IL- 1. ***(Weinhold and Ruther, 1997)***

Tumour necrosis factor alpha, transforming growth factor b, and IL-11 have also been shown to affect hepatic CRP expression. ***(Baumann and Schendel, 1991)***

There is also evidence of CRP expression by Kupffer cells and peripheral blood mononuclear cells, where it was shown to be a membrane protein that is not secreted. ***(Kuta and Baum, 1986)***

CRP is one of the acute phase proteins, the serum or plasma levels of which rise during general, non specific response to a wide variety of diseases. These include infections by gram positive and gram negative organisms, acute phase of rheumatoid arthritis, Pneumonia, and inflammation of the bile duct. CRP levels rise in serum or plasma within 24 to 48 hours following acute tissue damage, reach a peak during the acute stage and decrease with the resolution of inflammation or trauma.***(Kushner, 1991)***

The increase of CRP concentration in human serum or plasma may last for several days before decreasing to normal levels. ***(Dixon, 1984)***

CRP levels rise rapidly in response to several inflammatory stimuli, bacterial infection being one of the most potent. The secretion of CRP begins within 4–6 hours of the stimulus, doubling every 8 hours, and peaking at 36–50 hours. After the