“A CLINICAL STUDY OF URINARYALBUMIN TO CREATININE RATIO INCRITICALLY ILL PATIENTS”

By

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LIST OF ABBREVIATIONS

μL .....Microliter

(A-a)Do_2.....Alveolar-arterial Oxygen Difference

ACR .....Albumin Creatinine Ratio

AIDP .....Acute Inflammatory Demyelinating Polyneuropathy

ALI .....Acute Lung Injury

ALP .....Alkaline Phosphatase

ALT .....Alanine Aminotransferase

APACHE II .....Acute Physiology and Chronic Heath Evaluation

APS .....Acute Physiology Score

ARDS .....Acute Respiratory Distress Syndrome

ARF .....Acute Respiratory Failure

AST .....Aspartate Aminotransferase

AT III .....Antithrombin III

BP .....Blood Pressure

BT .....Bleeding Time

C .....Complement

C/S .....Culture and Sensitivity

Ca .....Calcium

CD .....Clusters of Differentiation

CLD .....Chronic Liver Disease

CNS .....Central Nervous System

CSF .....Cerebrospinal fluid

CT .....Computed Tomography

CT .....Clotting Time

CVA .....Cerebrovascular Accident

CXR .....Chest X Ray

DIC .....Disseminated Intravascular Coagulation

DLC .....Differential Leucocyte Count

DOA.....Date of Admission

DOD.....Date of Discharge/Death

ECG .....Electrocardiography

ELISA .....Enzyme-linked Immunosorbent Assay

ESR .....Erythrocyte Sedimentation Rate

FiO_2 .....Inspired Oxygen

GCS .....Glasgow Coma Scale

GI .....Gastrointestinal

H/N .....Hospital Number

Hb .....Hemoglobin

HbA_{1C} .....Glycated Hemoglobin

ICU .....Intensive Care Unit

IFN .....Interferon

IL .....Interleukin

IL-1ra .....Interleukin-1 Receptor Antagonist

iNOS .....Inducible Nitric Oxide Synthetase

ITU .....Intensive Therapy Unit

IκB .....Inhibitor Kappa B

K .....Potassium

LOC .....Loss of Consciousness

LPS .....Lipoplysaccharides

LRTI .....Lower Respiratory Tract Infection

M/E .....Microscopic Examination

M/N.....MRD number

MA.....Microalbuminuria

Mg .....Magnesium

MODS .....Multi Organ Dysfunction Syndrome

MPM .....Mortality Probability Model

MSOF .....Multi System Organ Failure

Na .....Sodium

NFκB .....Nuclear Factor Kappa B

NO .....Nitric Oxide

NOS .....Nitric Oxide Synthetase

NS .....Nonsurvivors

P.....Pulse

PAI .....Plasminogen Activator Inhibitor

PaO_2 .....Arterial Partial Pressure of Oxygen

PLT .....Platelet

PREVEND .....Prevention of Renal and Vascular End Stage Disease

PT .....Prothombin Time

RBS.....Random Blood Sugar

ROS .....Reactive Oxygen Species

RR.....Respiratory rate

S.....Survivors

SAPS .....Simplified Acute Physiology Score

SIRS .....Systemic Inflammatory Response Syndrome

SOFA .....Sequential Organ Failure Assessment

sTNFr .....Soluble Tumour Necrosis Factor Receptor

TBM .....Tubercular Meningitis

TGF .....Tumour Growth Factor

TLC .....Total Leucocyte Count

TNF .....Tumour Necrosis Factor

t-PA .....Tissue type Plasminogen Activator

U/A .....Urine Analysis

UAE .....Urinary Albumin Excretion

UO .....Urine Output

vWF .....von Willebrand Factor

WBC .....White Blood(Cell) Count

ABSTRACT

INTRODUCTION:

"In Critical care units, prediction of outcome is of vital importance to the clinician. It allows planning of early therapeutic intervention and appropriate counseling of patient. Prognostic measures used in ICU should ideally detect short term changes in critical illnesses and also reflect impact of early therapeutic interventions on the outcome of patient. So sensitive, inexpensive and dynamic prognostic markers which generate rapid and reliable results are therefore desirable in the ICU setting".

OBJECTIVES:

1. To evaluate Urinary albumin to creatinine ratio within 6 hours of ICU admission and after 24 hours of ICU admission.
2. To correlate Urinary albumin to creatinine ratio with APACHE II score,SOFA score to predict outcome in critically ill patients.

METHOD:

In this prospective non-interventional study, 98 adult patients admitted to I.C.U. with more than 24 hours of ICU stay were included and after their informed consent, blood and urine samples were collected on admission to ICU and 6, 24 hours thereafter Spot urine sample collected at 6, 24 hours of admission to medical ICU ward. Sample will be tested for urine microalbumin by immunoturbidometric method and urinary creatinine was measured by calorimetric method. Albumin: creatinine ratio was measured. For disease prognosis scoring, GCS, SOFA and APACHE II scores were calculated simultaneously.

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INTRODUCTION

INTRODUCTION

Predicting clinical outcome is an important component of patient care in critical care units:

A number of prognostication tools for ICU patients have been developed to assess the severity of illness and predict prognosis. Though useful, these too are complex. For example, the widely used APACHE (acute physiology and chronic health evaluation) II score requires input of a large number of variables derived from the patient's history, physical examination, and initial laboratory data. This is also true of the APACHE III score, sequential organ failure assessment score (SOFA), simplified acute physiological score, and others. In addition, scoring systems rely mainly on data obtained early in the course of illness. It is well-known that the physiologic responses of patients to various insults and interventions vary. The strength of initial predictions therefore, may be influenced by numerous factors during the course of hospitalization. These factors may not be accounted for in the initial assessment. Therefore, these prognosis scoring tools, which not only require the utility of expensive and sophisticated equipments, may also underestimate actual disease outcome in terms of morbidity and mortality.

Multiple system organ failure (MSOF), which is the ultimate hallmark of most critically ill patients, has been described as a sequential failure of the lungs, liver, kidney and other vital organ systems after a variety of acute physiological conditions such as severe infections and sepsis, pancreatitis, hemorrhagic shock, multiple trauma, etc[1]. (MacKinnon K.L. et al 2000). Although the mechanism involved in the development of this syndrome are not entirely clear, it is proposed that MSOF after trauma, and severe acute systemic illnesses results from a inflammatory reaction with activation of leucocytes and release of free radicals and other mediators, such as

cytokines, from these cells. other studies have described a rapid increase in microalbumin excretion in acute inflammatory conditions, which related to systemic vascular damage by capillary leak syndrome.

Microalbuminuria, defined as 30-300 mg/day in a 24 hr collection or 30-300 µg/mg creatinine in a spot collection, is an early marker of glomerular injury. ‟Microalbuminuria has a rapid onset and typically lasts for <48 hrs. The degree of development of microalbuminuria can be proportional to the severity of the illness''.

Microalbuminuria is a simple, less expensive, and prognostic tool for critically ill patients in intensive care units. It has been found to be comparable with the APACHE II and SOFA score.

From medical records of ShriB.M.Patil medical College, Vijayapur.it has been observed that a significant percentage of patients undergoing treatment in the medicine department are critically ill and require high dependency care in the ICUs. If a simple easily performed and relatively inexpensive prognostic tool for assessing the prognosis of critically ill patients could be identified, this will be of benefit to the patients in terms of expenditure and will reduce the resource burden of the hospital.

Studies on utility of microalbuminuria as a prognostic tool for assessing severity of illness of critically ill ICU patients have been done by various workers. However such studies have not been carried out in this part of the country.

Hence, considering the large number of critically ill patients admitted to our hospital, it has been proposed to carry out this study on the role of albumin to creatinine ratio as a prognostic tool in assessing severity of illness and mortality in critically ill patients admitted to the ICU, Department of Medicine, ShriB.M.Patil Medical College, Vijayapura with the following aims and objectives:

1) To find out whether measurement of microalbuminuria and urinary albumin to creatinine ratio can be used as a predictor of outcome in critically ill patients.

2) To compare urinary albumin to creatinine ratio with GCS, APACHE II score and SOFA score as a predictor for mortality in critically ill patients.

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

1. To evaluate Urinary albumin to creatinine ratio within 6 hrs of ICU admission and after 24 hrs of ICU admission in critically ill patients.
2. To compare Urinary albumin to creatinine ratio with APACHE II score and SOFA score as a predictor for mortality in critically ill patients.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

CRITICALLY ILL PATIENTS:

Definition:

Critically ill patients are those that by dysfunction or failure of one or more organs/system depend on survival from advanced instruments of monitoring and therapy[2].

Since these patients are at imminent risk of death; the severity of illness must be recognized early and appropriate measures taken promptly to assess, diagnose and manage the illness.

The condition usually results from infection, injury, hypoperfusion and hypermetabolism.

1) Infectious causes:

- Bacterial sepsis
- Burn wound infections
- Candidiasis
- Cellulitis
- Community-acquired pneumonia
- Diabetic foot infection
- Infective endocarditis
- Influenza
- Intraabdominal infections (e.g., diverticulitis, appendicitis)
- Meningitis
- Nosocomial pneumonia

- Pseudomembranous colitis
- Pyelonephritis
- Septic arthritis
- Toxic shock syndrome
- Urinary tract infections

2) Noninfectious causes:

- Cerebrovascular accidents
- Adrenal insufficiency
- Acute mesenteric ischemia
- Autoimmune disorders
- Burns
- Chemical aspiration
- Cirrhosis
- Cutaneous vasculitis
- Drug reaction
- Electrical injuries
- Hemorrhagic shock
- Hematologic malignancy
- Intestinal perforation
- Medication side effect (e.g., theophylline)
- Myocardial infarction
- Pancreatitis
- Seizure
- Substance abuse (stimulants such as cocaine and amphetamines)
- Surgical procedures

- Toxic epidermal necrolysis
- Transfusion reactions
- Upper gastrointestinal bleeding
- Vasculitis

The primary cause triggers an uncontrolled inflammatory response. Sepsis is the most common cause. Sepsis may result in septic shock. In the absence of infection a sepsis-like disorder is termed systemic inflammatory response syndrome (SIRS). Both SIRS and sepsis could ultimately progress to multiple organ dysfunction syndrome. However, in one-third of the patients no primary focus can be found. Multiple organ dysfunction syndrome is well established as the final stage of a continuum Systemic inflammatory response syndrome → sepsis → severe sepsis → Multiple organ dysfunction syndrome.

"SIRS is developed by ischemia, inflammation, trauma, infection, or a combination of several insults".It is nonspecific. Infection is defined as "a microbial phenomenon characterized by an inflammatory response to the microorganisms or the invasion of normally sterile tissue by those organisms[3]."

Trauma, inflammation, or infection leads to the activation of the inflammatory cascade. When SIRS is mediated by an infectious insult, the inflammatory cascade is often initiated by endotoxin or exotoxin. Tissue macrophages, monocytes, mast cells, platelets, and endothelial cells are able to produce a multitude of cytokines.

The following definitions were proposed by consensus conference committees in 1992 and 2001 to describe the conditions of septic patients[4].

Table-1: Definition used to describe conditions of septic patients

1) Bacteremia	Presence of bacteria in blood, as evidenced by positive
	blood cultures
2)Septicemia	Presence of microbes or their toxins in blood
3)Systemic	Two or more of the following conditions:
inflammatory response	(1) fever (oral temperature >38°C) or hypothermia
syndrome (SIRS)	(<36°C);
	(2) tachypnea (>24 breaths/min);
	(3) tachycardia (heart rate >90 beats/min);
	(4) leukocytosis (>12,000/L), leukopenia (<4,000/L), or
	>10% bands; may have a noninfectious etiology
4) Severe sepsis	Sepsis with one or more signs of organ dysfunction—for
	example:
	1. Cardiovascular: Arterial systolic blood pressure 90
	mmHg or mean arterial pressure 70 mmHg that responds to
	administration of intravenous fluid
	2. Renal: Urine output <0.5 mL/kg per hour for 1 h despite
	adequate fluid resuscitation
	3. Respiratory: PaO_2/FiO_2 250 or, if the lung is the only
	dysfunctional organ, 200
	4. Hematologic: Platelet count <80,000/L or 50% decrease
	in platelet count from highest value recorded over previous
	3 days
	5. Unexplained metabolic acidosis: A pH 7.30 or a base

	deficit 5.0 mEq/L and a plasma lactate level >1.5 times
	upper limit of normal for reporting lab
	6. Adequate fluid resuscitation: Pulmonary artery wedge
	pressure 12 mmHg or central venous pressure 8 mmHg
5)Septic shock	Sepsis with hypotension (arterial blood pressure <90
	mmHg systolic, or 40 mmHg less than patient's normal
	blood pressure) for at least 1 h despite adequate fluid
	resuscitation.
	Or
	Need for vasopressors to maintain systolic blood pressure
	90 mmHg or mean arterial pressure 70 mmHg"
6)Refractory septic	Septic shock that lasts for >1 h and does not respond to
shock	fluid or pressor administration
7)Multiple-organ	Dysfunction of more than one organ, requiring intervention
dysfunction syndrome	to maintain homeostasis
(MODS)	

"Sepsis is the systemic respose to infection and is defined as the presence of SIRS in addition to a documented or presumed infection. Severe sepsis meets the aforementioned criteria and is associated with organ dysfunction, hypoperfusion, or hypotension".

Sepsis-induced hypotension is defined as the presence of a systolic blood pressure of less than 90 mm Hg or a reduction of more than 40 mm Hg from baseline in the absence of other causes of hypotension. Septic shock criteria ispersistent hypotension and perfusion abnormalities despite adequate fluid resuscitation. MODS is a state of physiological derangements in which organ function is not capable of maintaining homeostasis.

Pathophysiology of Systemic Inflammatory Response Syndrome and Multiorgan Dysfunction Syndrome

A) Immuno-inflammatory Response

The production of proinflammatory cytokines, adhesion molecules, vasoactive mediators and reactive oxygen species in the immuno-inflammatory process common to both SIRS and sepsis.

1) Lipoplysaccharides and C5a:

"In sepsis, activation of innate immune cells, predominantly mononuclear phagocytes, occurs in response to endotoxin also called lipopolysaccharide (LPS). This is a component of gram negative bacterial cell walls. In the circulation, LPS is bound by lipopolysaccharide binding protein. This complex can bind to CD14 a cell surface receptor of macrophages and circulating monocytes" .Exotoxins from gram positive bacteria or products of activation of the compliment system such as C5a which can stimulate same process.

2) Cytokines:

"Cytokines are soluble, low molecular weight glycoproteins which regulate both innate and specific immune responses and it is a inflammatory mediators. Individual cytokines can be produced by multiple cells and are pleiotropic acting on multiple target cells in different ways depending on timing and concentration. At low concentrations cytokines have a paracrine effect, at increased concentrations cytokines have endocrine effects such as sepsis".

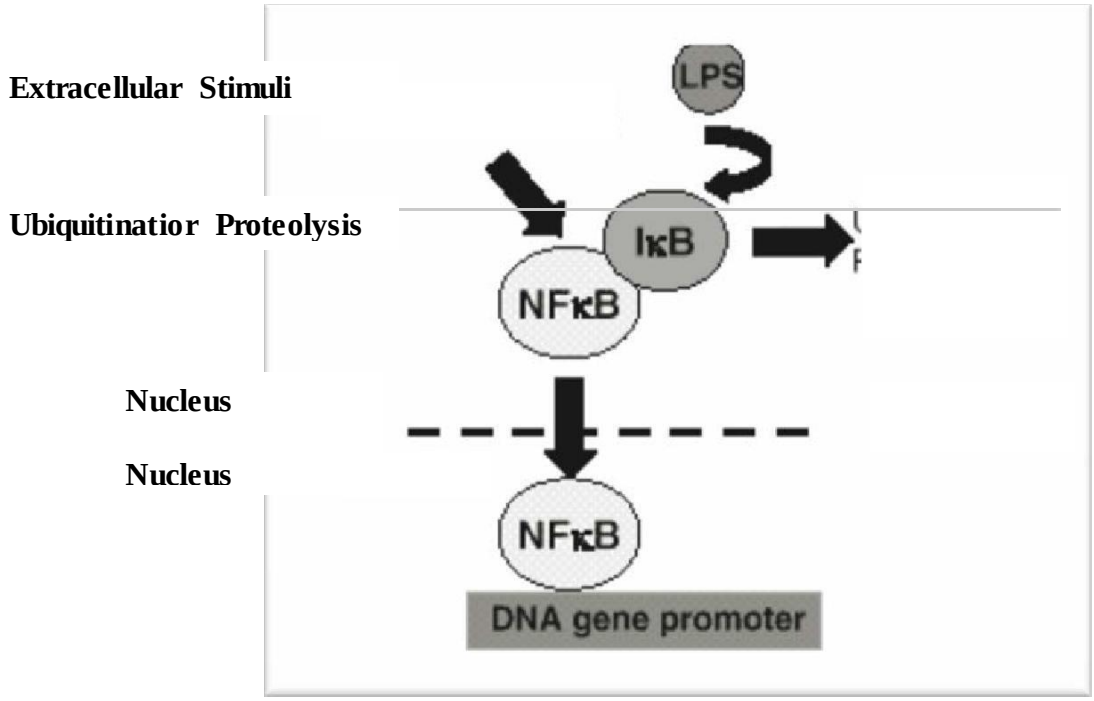
Several cytokines plays an important role in development of SIRS and sepsis, including tumour necrosis factor a (TNF α), interleukins (IL- I L-1b, IL-8, IL-6, IL-10, IL-4, IL-13), interferon g (IFN γ), and transforming growth factor-β[6]. Several circulating cytokines, including TNF α, IL-1b, IL-6, IL-8 and IL-10 have been shown to be linked to morbidity and mortality in patients with sepsis[7,8].

TNF α and IL-1b are produced mainly from mononuclear leucocytes in response to endotoxin. They cause increased synthesis and stimulate the production of IL-6, IL-8 and IL-10. TNF α and IL-1b produce fever, activate the clotting system and mediate inflammation through production of IL-8. IL-6 stimulates production of acute phase proteins from the liver and acts to inhibit the production of TNF α and IL-1b. High circulating concentrations of IL-6 have been correlated with poor outcome in sepsis but this may reflect severity of disease rather than a direct causal effect of IL-6.

3) Activation of nuclear factor kappa B (NFkB):

NFkB is a primary transcription factor pre-existent in the cellular cytoplasm complexed with the inhibitory subunit IkB. In response to extracellular stimuli, IkB undergoes phosphorylation and ubiquitination allowing its proteosomal degradation. Free NFkB is able to translocate into the nucleus and bind to the promoter region of its target gene. Control of the expression of inflammatory cytokines from their

respective genes is controlled by intracellular transcription factors in particular nuclear factor kappa B (NFkB). High levels of NFkB from patients with sepsis have been associated with poor outcome[9].



4) Role of anti-inflammatory mediators:

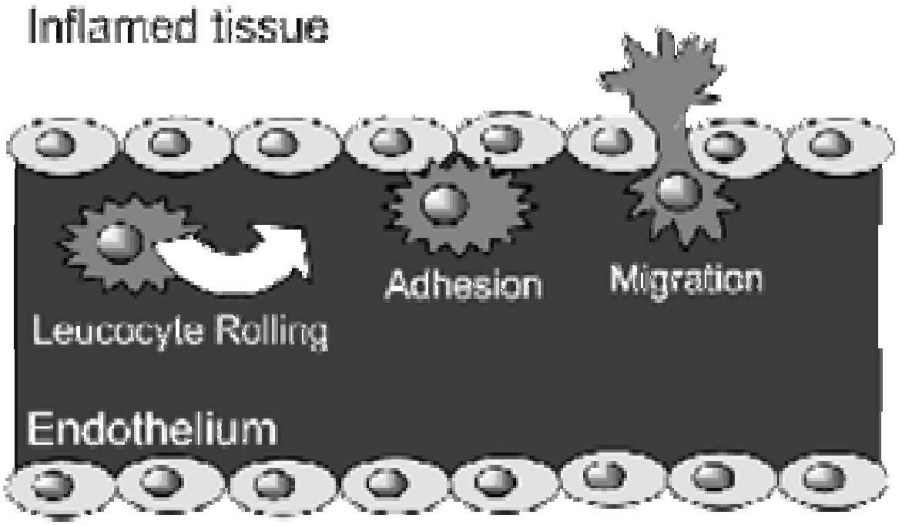
In response to pro-inflammatory mediators, there is endogenous production of anti-inflammatory cytokines and cytokine antagonists. Several anti-inflammatory cytokines IL-4, IL-10 and IL-13 inhibit production of cytokines from the host leucocytes. IL-1 receptor antagonist (IL-1ra), a soluble cytokine antagonist, inhibits IL-1 activity by binding competitively to IL-1 receptors. Soluble TNF receptors (sTNFr) are receptors present in the circulation cleaved from host cells. Their proposed role is that of an antagonist by binding TNF and preventing its biological action, though at lower concentrations sTNFr may act as a carrier of the cytokine. Administration of IL-10 attenuates production of TNF α and decreases mortality whereas anti-IL-10 worsens mortality in sepsis in animals[10,11]. High circulating concentrations Interleukin-10 found in patients with sepsis who die[12] but low

concentrations correlate with poor outcome in ARDS[13]. These may balance and control the pro-inflammatory responses and it may be an imbalance or a failure of these systems that lead to inflammation in sepsis.

B) Tissue Injury and the Inflammatory Response

Tissue injury pathogenesis is complex and cannot be attributed to a single agent. Tissue injury occurs during inflammation and is a progressive process which lead to organ dysfunction and failure. Circulating neutrophils interact with the vascular endothelium in a three-stage process of rolling, adhesion and migration.

1. Leucocyte rolling is mediated through pro-inflammatory cytokines induced expression of selectins on leucocytes and endothelium.
2. Adhesion: occurs through binding of leucocyte b2 integrins to endothelial immunoglobulin superfamily including VCAM and ICAM-1[14]. Expression of adhesion molecules is increased in critical ill patients with sepsis and highest in those patients with MOF[15,16].
3. Migration: "Adherent leucocytes are able to migrate into the tissues". Leucocyte migration is mediated by chemokines , ICAM-1 and ß1 integrins.



Polymorphonuclear leucocytes are the main cellular mediators of tissue injury. They accumulate in tissues in response to endotoxin and pro-inflammatory cytokines mediated through IL-8 a chemokine, which is a powerful chemoattractant and activator of polymorphonuclear leucocytes. Tissue injury occurs due to degranulation of the leucocytes producing proteases (including elastase and matrix metalloproteinases) and the production of reactive oxygen species (ROS). Activated neutrophils produce large amounts of ROS from membrane bound NADPH oxidase which produces the oxygen free radical superoxide and hydroxyl radical.

C) Organ Dysfunction and the Inflammatory Response

1) Respiratory Dysfunction

Pulmonary dysfunction in the patient with sepsis or SIRS is manifested as tachypnea, hypoxemia and respiratory alkalosis.Pulmonary dysfunction common in sepsis. When severe it may progress to acute lung injury (ALI) and acute respiratory distress syndrome (ARDS). ARDS may complicate up to 60% of cases of septic shock[17].

" Pulmonary capillary endothelial dysfunction resulting in interstitial and alveolar edema of protein and phagocytic immune cell rich exudative fluid.

Endothelial permeability is increased in response to pro-inflammatory cytokines with progression to alveolar denudation and basement membrane destruction". Neutrophils are sequestrated into the lung in response to IL-8 and IL-8 in lung bronchoalveolar lavage fluid in patients with ARDS has been shown to correlate with mortality[18].

2) Cardiovascular Dysfunction

Both the heart and the blood vessels are sensitive to the effects of pro-inflammatory cytokines as well as vasoactive substances present in excessive amounts in sepsis. "Nitric oxide is synthesised in the vascular endothelium and smooth muscle in response to pro-inflammatory cytokines". Nitric oxide is the vasoactive mediator responsible for the fall in systemic vascular resistance underlying the hypotension in septic shock[19]..Nitric oxide is synthesised by nitric oxide synthase (iNOS).

"The response to the fall in blood pressure is an increase in cardiac output". Baroreceptors mediate a pronounced tachycardia and stroke volume increases due to decreased afterload but hypovolaemia may decrease preload and thus cardiac output. Independent of the effects of preload and afterload intrinsic myocardial depression is present within 24 hours of the onset of sepsis. Endotoxin and pro-inflammatory cytokines have both been shown to induce myocardial depression. These effects are probably mediated through nitric oxide.Constitutive NO in the heart is responsible for leucitropy, the ability of the myocardium to relax, thus maximising end diastolic filling and coronary artery perfusion. Inducible NOS is expressed in cardiac myocytes in response to cytokines and increases NO production. Nitric oxide reduces myocardial contractility and responsiveness to β-adrenergic agents mediated through increased cGMP[20].

3) Metabolic Disturbances

The alteration in haemodynamic regulation produces inappropriate distribution of perfusion and arteriovenous shunting resulting in tissue hypoxia and lactic acidosis. "The cellular hypoxia is due to impaired cellular oxygen extraction". Evidence suggest that occurs at a mitochondrial level mediated through NO which blocks the mitochondrial electron transfer chain at its terminal receptor of cytochrome oxidase. This causes cellular hypoxia and an increase in mitochondrial derived ROS concentrations[21].

4) Renal Dysfunction

Renal dysfunction occurs in 50% of cases of septic shock and significantly increases mortality.Normally, the kidney maintains renal blood flow and glomerular filtration through autoregulation dependent on the tone of the afferent and efferent arterioles, which isdisturbed in sepsis.

The cytokine-induced systemic vasodilatation and relative hypovolaemia in sepsis are responsible for renal hypoperfusion.

"The renal vasculature has been shown to participate variably to mediators of systemic vasodilatation and renal blood flow has been shown to be variable in sepsis models. Therefore, it is difficult to predict renal blood flow from systemic blood pressure parameters. The kidney produces intrinsic vasoconstrictors in response to cytokines and the renin-angiotensin-aldosterone system". In particular, the arachidonic acid metabolites of thromboxane and leukotrienes both reduce renal blood flow and antagonists of these substances have been shown to have renal protective effects.

In common with other tissues, the kidney is susceptible to leucocyte mediated tissue injury with neutrophil aggregation in response to chemokines and production of proteases and ROSs[22].

5) Haematological Dysfunction

"Sepsis occurs with a coagulation disorder due to the cytokine-mediated activation of the coagulation pathways. This disseminated intravascular coagulation (DIC) produces both bleeding and microvascular thrombi which have been proposed as mechanisms of MOF. The cytokine-mediated activation of coagulation in sepsis occurs via the tissue factor dependent extrinsic pathway. Tissue factor is the activator of and cofactor for factor VIIa activation of factors IX and X of the extrinsic pathway".

Monocytes and endothelial cells express tissue factor in response to endotoxin, complement fractions, IL-6 and IL-8[23]. Antithrombin III (ATIII) is an inhibitor of the serineproteases responsible for coagulation clotting factors IXa, Xa, XIa and XIIa and thrombin. Circulating levels of ATIII are reduced in sepsis and shock and the reduction in plasma concentration correlates with mortality in sepsis. "Thrombomodulin is an endothelial cell helps in inhibitor of clotting and activator of fibrinolysis. It acts as a thrombin binding protein, reducing the effects of thrombin. The thrombin-thrombomodulin complex has further anti-coagulant properties as an activator of protein C which, with cofactor protein S, inactivates factors V and VIII". In sepsis, the production of thrombomodulin by endothelial cells is downregulated by pro-inflammatory cytokines and circulating free levels of protein S are reduced[24].

6) Gastrointestinal Dysfunction

GI tract propagate the injury of sepsis. Overgrowth of bacteria in the upper GI tract may be aspirated into the lungs, producing nosocomial or aspiration pneumonia. When normal barrier function of the gut affected, allows translocation of bacteria and endotoxins into the systemic circulation and responsible for the septic response. Septic shock can cause paralytic ileus that can lead to a delay in institution of enteral feeding.

7) Liver

The abnormal synthetic functions caused by liver dysfunction can contribute to both the initiation and progression of sepsis. The reticuloendothelial system of the liver acts as a first line of defense in clearing bacteria and their products; liver dysfunction leads to a translocation of these products into systemic circulation.

Liver failure or shock liver can manifest by elevation of liver enzymes and bilirubins, coagulation defects, and failure to excrete toxins such as ammonia, which lead to worsening encephalopathy.

8) Central Nervous System Dysfunction

Involvement of the CNS in sepsis produces encephalopathy and peripheral neuropathy. The pathogeneses is poorly known but likely related to systemic hypotension, which can lead to brain hypoperfusion.

Mortality

The mortality rates in the previously mentioned[25] study were 7% (SIRS), 16% (sepsis), 20% (severe sepsis), and 46% (septic shock). The medial time interval from SIRS to sepsis was inversely related to the number of SIRS criteria (2, 3, or all 4) met. Morbidity is related to the causes of SIRS, complications of organ failure, and the potential for prolonged hospitalization. Pittet et al[26] showed that control patients had the shortest hospital stay, while patients with SIRS, sepsis, and severe sepsis, respectively, required progressively longer hospital stays.

Zhang Z, et al[26] conducted a study in 2012 came to conclusion that ACR obtained on entry to ICU was highly predictive of AKI, and was also associated with mortality rate and ICU length of stay.

A study by Shapiro et al[27] 2006, evaluated mortality in patients with suspected infection in the emergency department. The hospital mortality rates were as follows: 2.1% had a suspected infection without SIRS, 1.3% had sepsis, 9.2% had severe sepsis, and 28% had septic shock. The presence of SIRS criteria alone had no prognostic value for either in-hospital mortality or 1-year mortality. Each additional organ dysfunction increased the risk of mortality at 1 year. The authors concluded that organ dysfunction, rather than SIRS criteria, was a better predictor of mortality.

"Patients without an identified infection, according to Heffner AC et al[28] 2010, had a lower hospital mortality rate than those with an infectious etiology for their SIRS (9% v 15%; p=0.03). Comstedt et al[29] 2009, in a study of SIRS in acutely hospitalized medical patients, demonstrated a 6.9 times higher 28-day mortality in SIRS patients as compared with non-SIRS patients. Most deaths occurred in SIRS patients with an associated malignancy".

Extreme of ages (both young and old) may not manifest as typical criteria for SIRS; therefore, clinical suspicion may be required to diagnosis a serious illness (either infectious or noninfectious).

1) Patients receiving a beta-blocker or a calcium channel blocker are likely unable to elevate their heart rate and, therefore, tachycardia may not be present.
2) Although blood pressure is not one of the 4 criteria, it is still an important marker. If the blood pressure is low, the establishment of intravenous

access and fluid resuscitation is of utmost importance. Frank hypotension associated with SIRS is uncommon unless the patient is septic or severely dehydrated. Hypotension may lead to the patient being admitted or transferred to a higher acuity unit.

3) Respiratory rate is the most sensitive marker of the severity of illness.

Multiorgan Dysfunction Syndrome

Multiple organ dysfunction is a continuum SIRS, with incremental degrees of physiological derangements in individual organs; Alteration in organ function can vary from a mild degree of organ dysfunction to completely irreversible organ failure. The degree of organ dysfunction has a major clinical impact.

"MODS is defined as a clinical syndrome in which the development of progressive and reversible physiological dysfunction in 2 or more organs or organ systems induced by a variety of acute insults, including sepsis".

The transition from SIRS to MODS is often characterized by the following features:

1. Worsening of liver function, possibly affected by activated kupffer cells.Impairment of extraction and utilization of oxygen at a microcirculatory level, which could be related to capillary damage or to disturbed cellular function at the tissue level. Hypoxia to tissue cells leads to progressive worsening of organ function.
2. The clinical expression of the above feature is an increase in the mixed venous oxygen saturation.

Methods for Assessment of Severity of Illness in Critically Ill Patients:

Categorization of a patient's illness according to severity of disease in the intensive care unit (ICU). There are numerous scoring systems that have been developed and validated over the past two decades.

Severity-of-illness scoring systems are important for defining populations of critically ill patients.Severity-of-illness scores are also useful in guiding hospital administrative policies. Allocation of resources, such as nursing and ancillary care, can be directed by such scoring systems. Severity-of-illness scoring systems can also

assist in the assessment of quality of ICU care over time. Scoring system validations are based on the premise that increasing age, presence of chronic medical illnesses, and increasingly severe derangements from normal physiology are each associated with increased mortality. All currently existing severity-of-illness scoring systems arederived from patients who have been already admitted to the ICU.

Currently, the most commonly utilized scoring systems are the APACHE (acute physiology and chronic health evaluation) system, the SOFA (sequential organ failure assessment) score. These were designed to predict outcomes and severity-of-illness scoring systems in critical ill patients with common variables. These include age; vital signs; assessments of respiratory, renal, and neurologic function; and an evaluation of chronic medical illnesses.

A) APACHE II Scoring System

The APACHE (Acute Physiology and Chronic Health Evaluation) scoring system was developed to provide an objective assessment of severity of illness in patients in the ICU. It is the most commonly used severity-of-illness scoring system. Age, type of ICU admission, a chronic health problem score, and 12 physiologic variables (the most severely abnormal of each in the first 24 h of ICU admission) are used to derive a score.More recently, the APACHE III scoring system has been released. This scoring system is similar to APACHE II, in that it is based upon age, physiologic abnormalities, and chronic medical comorbidities. The database from which this score was derived is larger.

"The APACHE scoring system is widely used in to measure of disease severity in the study patients. The following pages demonstrate how to generate an APACHE II score. The APACHE II score is more widely used".

The APACHE II score consists three components:

1. **Acute Physiology Score (APS).** The largest component of the APACHE II score isderived from 12 clinical measurements that are obtained within 24 hours after admission to the ICU". The most abnormal measurement is selected to generate the APS component of the APACHE II score. If a variable has not been measured, it is assigned zero points.
2. **Age Adjustment.** From one to six points is added for patients older than 44 yearsof age.
3. **Chronic Health Evaluation.** An additional adjustment is made for patients withsevere and chronic organ failure involving the heart, lungs, kidneys, liver, and immune system.
4.

Table-2: Acute Physiology Score

Score	4	3	2	1	0	1	2	3	4
Rectal temperature, °C	≥41	39.0-40.9		38.5-38.9	36.0-38.4	34.0-35.9	32.0-33.9	30.0-31.9	≤29.9
Mean blood pressure, mmHg	≥160	130-159	110-129		70-109		50-69		≤49
Heart rate	≥180	140-179	110-139		70-109		55-69	40-54	≤39
Respiratory rate	≥50	35-49		25-34	12-24	10-11	6-9		≤5
Arterial pH	≥7.70	7.60-7.69		7.50-7.59	7.33-7.49		7.25-7.32	7.15-7.24	<7.15
Oxygenation									
If FI_{O2}> 0.5, use (A – a) D_{O2}	≥500	350-499	200-349		<200				
If FI_{O2} ≤0.5, use Pa_{O2}					>70	61-70		55-60	<55
Serum sodium, meq/L	≥180	160-179	155-159	150-154	130-149		120-129	111-119	≤110
Serum potassium, meq/L	≥7.0	6.0-6.9		5.5-5.9	3.5-5.4	3.0-3.4	2.5-2.9		<2.5
Serum creatinine, mg/dL	≥3.5	2.0-3.4	1.5-1.9		0.6-1.4		<0.6		
Hematocrit	≥60		50-59.9	46-49.9	30-45.9		20-29.9		<20
WBC count, 10^3/mL	≥40		20-39.9	15-19.9	3-14.9		1-2.9		<1

Table-3: Glasgow Coma Scale[b, c]

Eye opening	Verbal (nonintubated)	Verbal (intubated)	Motor activity
4) Spontaneous	5) Oriented and talks	5)Seems able to talk	6)Verbal command
3) Verbal stimuli	4)Disoriented and talks	3)Questionable ability to talk	5)Localizes pain
2) Painful stimuli	3)Inappropriate words	1)Generally unresponsive	4)Withdraws to pain
1) No response	2)Incomprehensible sounds		3)Decorticate
	1)No response		2)Decerebrate
			1)No response

Table-4: Points assigned to Age and Chronic disease as part of the APACHE II score

APACHE II score	
A) Age, Years	Score
<45	0
45-54	2
55-64	3
65-74	5
≥75	6

[a]APACHE II score is the sum of the acute physiology score (vital signs, oxygenation, laboratory values), Glasgow coma score, age, and chronic health points. Worst values during first 24 h in the ICU should be used.

[b]Glasgow coma score (GCS) = eye-opening score + verbal (intubated or nonintubated) score + motor score

For GCS component of acute physiology score, subtract GCS from 15 to obtain points assigned.

d" Chronic health conditions: liver, cirrhosis with portal hypertension or encephalopathy; cardiovascular, class IV angina (at rest or with minimal self-care activities); pulmonary, chronic hypoxemia or hypercapnia, polycythemia, ventilator dependent; kidney, chronic peritoneal or hemodialysis; immune, immunocompromised host.''

Limitations of APACHE II Scoring System:

1. The APS score has no adjustments for measurements obtained in the presence of interventions such as hemodynamic support drugs, mechanical ventilation, or antipyretic therapy.
2. There is an exaggerated penalty for old age. For example, age greater than 65 years adds more points than an A-a Po2 gradient above 500 mm Hg (6 points versus 4 points, respectively).
3. There is no consideration for malnutrition or cachexia in the chronic health evaluation.

B) Sequential Organ Failure Assessment (SOFA) Score:

The Sequential Organ Failure Assessment (SOFA) score is designed to evaluate the function of six major organ systems (i.e., cardiovascular, respiratory, renal, hepatic, central nervous system, and coagulation) over time. The score is obtained on the day of admission and each of the following days in the ICU. Because the SOFA score monitors daily changes in organ function, it can evaluate the patient's response to treatment, and sequential changes in the SOFA score (e.g., increasing or decreasing) can predict the eventual outcome of the ICU stay. The SOFA score differs from the APACHE II score in the following ways:

1. The APACHE II score is performed only on the day of admission, and does not monitor the clinical course of the patient, and

2. The APACHE II score has no adjustment for the use of hemodynamic support drugs, and the SOFA score does.

Table-5: SOFA Score

Organs	0	1	2	3	4
1)Respiration PaO_2/FiO_2	>400	≤400	≤300	≤200[a]	≤100[a]
2)Coagulation PLT, $10^3/\mu L$	>150	≤150	≤100	≤50	≤20
3)Liver Bilirubin, mg/dl (µmol/L)	<1.2 (<20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (>204)
4)Cardiovascular Hypotension	No Hypotension	MAP <70mmhg	Dopamine ≤ 5 or Dobutamine (any dose)[b]	Dopamine >5 or Epinephrine ≤0.1 or Norepinephrine ≤0.1[b]	Dopamine >15 or Epinephrine >0.1 or Norepinephrine >0.1[b]
5)CNS GCS	15	13-14	10-12	6-9	<6
6)Renal Creatinine, mg/dl(µmol/L) or urine Output	<1.2 (<110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440) <500 ml/d	>5.0 (>440) <200 ml/d

[a]with respiratory support

[b]Adrenergic agents administered for atleast 1 h (micrograms per kilogram body weight per minute)

In this study we tried to compare the increasing or decreasing trend of microalbuminuria as a prognostic indicator for the patients admitted in ICU with the various scoring systems for assessing the severity of illness, namely Glasgow coma scale, APACHE II Score and SOFA score.

Role of Microalbuminuria in Critically Ill Patients:

Microalbuminuria, defined as 30-300 mg/day in a 24 hr collection or 30-300 µg/mg creatinine in a spot collection, is an early marker of glomerular injury.

"Microalbuminuria has a rapid onset and typically lasts for <48 hrs. The degree of development of microalbuminuria can be proportional to the severity of the illness''. Epidemiologic and experimental data show that microalbuminuria is

associated with an increased risk for cardiovascular mortality, cerebrovascular disease, and, possibly, peripheral arterial disease (PAD).

The presence of microalbuminuria also seems to predict all cause mortality in the general population[30,31,32,33]. This was initially shown in the Prevention of Renal and Vascular End stage Disease (PREVEND) study, in which inhabitants of Groningen, The Netherlands, who were aged 28 to 75 yr were sent a questionnaire and a vial to collect an early-morning urine sample for measurement of UAE[34]. A total of 40,548 participants who were followed for 2.6 yr were included in an analysis of mortality by baseline UAE. A clear positive relationship was observed between UAE and all-cause, cardiovascular, and non cardiovascular death.

As the interface between the circulating blood and vascular smooth-muscle cells, endothelial cells have several key functions: they actively regulate vascular tone and permeability, leukocyte extravasation, the balance between coagulation and fibrinolysis, and the proliferation of vascular smooth-muscle and renal mesangial cells. Inflammatory mediators, such as tumor necrosis factor, interleukins, and oxygen free radicals, can dramatically alter the role of the endothelium in acute diseases, and in sepsis particularly. An early feature is increased capillary permeability causing an extravasation of plasma proteins and water, leading to interstitial edema. Small increases in glomerular permeability are amplified by the renal concentrating mechanism to produce large changes in albumin excretion, since the tubular reabsorptive mechanisms for albumin are close to saturation.

Microalbuminuria is often associated with increased vascular permeability in acute inflammatory conditions. In such conditions, microalbuminuria has a rapid onset and typically lasts for <48 h unless complications occur. The degree of development of microalbuminuria can be proportional to the severity of the illness.

"Microalbuminuria is an early feature of sepsis and may predict disease severity ". In acute pancreatitis, high levels of microalbuminuria are usually followed by severe complications.

Significantly higher levels of microalbuminuria were found among patients with sepsis as compared to those without sepsis.

The change in microalbuminuria levels over 24 hours can be used to measure the effectiveness of therapy. Persistence of high levels or increasing trend of microalbuminuria levels over 24 hours was found to be a predictor of a poor outcome. A high level of microalbuminuria at 24 hours and increasing trend of microalbuminuria also predicted mortality better than APACHE II and SOFA scores[35].

Drumhelleret al[36] 2012 conducted a pilot study, microalbuminuria measured by Point Of Care ACR was associated with disposition in Emergency Department patients with sepsis or severe sepsis.

AzimHonarmandet al[37] 2009, found very high incidence of microalbuminuria in critically ill trauma patients. Albumin excre- tion of 30-300 mg g-1 or more is an independent predictor of more than 7 days duration of mechanical ventilation. It is comparable in its prognostic characteristics to the widely used SOFA score, and both the ACR and SOFA score can be used together in estimating the risk of prolonged mechanical ventilation, even on the first day of admission of critically ill patients. It is also concluded that maintaining the level of ACR in normal range could shorten the duration of mechanical ventilation.

"Microalbuminuria at 24 hrs of ICU admission had a good sensitivity and specificity to predict mortality equivalent to APACHE II scores". The study indicated that microalbuminuria is an inexpensive, rapid diagnostic tool & could be effectively

utilised to Identify patients likely to survive in the ICU[38].

Pathophysiology of Microalbuminuria

The relationship between low-level albumin excretion and vascular permeability makes urinary albumin excretion highly sensitive to the presence of any inflammatory process. The kidney is ideally placed to amplify any small changes in systemic vascular permeability. The glomeruli receive 25% of the cardiac output. Of the 70 kg of albumin that pass through the kidneys every 24h, less than 0.01% reaches the glomerular ultrafiltrate (i.e. less than 7 g/24 h) and hence enters the renal tubules[39].

Almost all the filtered albumin is reabsorbed by the proximal tubule via a high-affinity, low-capacity endocytotic mechanism[40], with only 10-30 mg/24h appearing in the urine. Assuming that 7 g of albumin is filtered every 24 hr; a 1% increase in systemic vascular permeability in response to an inflammatory stimulus would result in an additional 70 mg of albumin passing into the filtrate. Since tubular mechanisms for albumin reabsorption are near saturation, urinary albumin excretion would increase from a maximum of 30 to approximately 100 mg/24 hr.

Glomerular permeability to albumin is dependent on endothelial charge selectivity as well as size selectivity. The negative charge conferred on the glomerular membrane by its constituent glycoproteins plays a role in restricting the permeability of anionic proteins. Loss of glomerular charge selectivity has been found in both diabetic and non-diabetic populations with microalbuminuria[41].

"Similarly, alterations in the fraction of plasma filtered by the glomerulus due to changes in blood pressure and intra glomerular pressure regulation may also result in relatively large changes in urinary albumin excretion".

"Microalbuminuria may be a marker of generalized vascular disease with arterial endothelial dysfunction". Endothelial dysfunction and alterations in theextracellular matrix leads to increase in vascular permeability.

Pathophysiological Processes Associated with Microalbuminuria

Local Process

1. Increased intraglomerular capillary pressure
2. Increased shunting of albumin through glomerular membrane pores.

SYSTEMIC PROCESS

1. Activation of inflammatory mediators
2. Increased transcapillary escape rate of albumin
3. Vascular endothelial dysfunction

Factors known to Influence the Development of Microalbuminuria

1. Increased body mass index
2. Increased blood pressure (systolic, diastolic, mean)
3. Altered lipid levels
4. Insulin resistance (hyperinsulinemia)
5. Smoking
6. Salt sensitivity
7. Elderly
8. Endothelial dysfunction

The endothelium produces components of the extracellular matrix and a variety of proteins that play an important role in vascular and renal function. Animpairment of normal endothelial antithrombotic and vasodilatory properties is a mainfactor in atherogenesis[42]. Thus, it has been proposed that defective endothelial permeability may be the origin of microalbuminuria in the general population.

Several studies suggest that endothelial dysfunction represent as a common pathway for macro- and microvascular disease[43]. Endothelial dysfunction seems to play a key role in (nondiabetic) glomerulosclerosis and atherosclerosis. Increased permeability of the endothelium allows atherosclerotic lipoprotein particles (oxidized LDL and others) to penetrate into the large vessel wall and promote the development of atherosclerotic plaques[42,44]. "This increase in vascular permeability coupled with beta-receptor hyporesponsiveness causes impaired insulin action by preventing insulin-mediated skeletal muscle vasodilation that compromises insulin induced glucose uptake".

Microalbuminuria is also associated with increased von Willebrand factor (vWF) and increased platelet adhesiveness.

Other biochemical indices of endothelial dysfunction include elevations in the plasma levels of angiotensin II, tissue type plasminogen activator (t-PA) and prothrombotic profile including plasminogen activator inhibitor–1 (PAI-1) and endothelin[42].

Microalbuminuria is proportional to the severity of the condition[44]. Ischemia and reperfusion are other conditions that follow this rule. Microalbuminuria is also detected in the presence of an acute myocardial infarction or peripheral vascular disease and is proportional to the severity of the infarct or of the claudication[45,46].

In the STENO hypothesis put forward by Deckertet al[47] (1989) albumin leakage into the urine is a reflection of widespread vascular damage. In a sense, the kidney is the window of the vasculature.

Some studies used markers of inflammation such as C-reactive protein, IL-6, and TNF-α, which indicate that low-grade inflammation is associated with the

occurrence and the progression of microalbuminuria and with an associated increased risk for atherosclerotic disease[48,49,50]. Other studies indicate that microalbuminuria, endothelial dysfunction, and low-grade inflammation are linked[44,51].

Another study says that some individuals are born with varying degrees of vascular function within a physiologic range and, therefore, excrete a variable amount of microalbumin. This inherent variability of the vascular state as determined by urine microalbumin excretion may be associated with susceptibility to subsequent organ damage[52].

Previously, glomerular barrier permeability was thought to depend mainly on glomerular basement membrane composition and slit diaphragm structure. Recent evidence, however, has pointed toward a more important, direct role of the endothelium in determining permeability to albumin. In particular, the glycocalix that fills the endothelial fenestrae seems to be important for glomerular size and chargeselectivity[53,54].Abnormalities in the endothelial glycocalix may contribute to microalbuminuria.

Screening and Monitoring Microalbuminuria At present, various antibody-based methods are used to measure lower levels of urinary albumin. These include RIA, nephelometry, immunoturbidimetry, and ELISA. Although the gold standard test for microalbuminuria is the radio immunoassay, other tests are generally sensitive enough for clinical practice.Immunoturbidimetric assay of microalbuminuria is based on the measurement of immunoprecipitation in liquid phase. Antibodies against human albumin are added to an aliquot of patient urine and reaction buffer. The antibodies undergo an agglutination reaction with albumin in urine, resulting in an increase in turbidity of the mixture. Turbidity is measured using a clinical chemistry

analysis at a wavelength of Ca 405 nm.

Recently, a method was developed by which not only immunoreactive but also immunounreactive albumin is measured[55]. Using this method, more patients are found to have an albumin excretion in the microalbuminuric range[56]. Whether patients who are detected as having microalbuminuria by this method are equally at risk for progressive renal and cardiovascular disease as those who are detected by the traditional antibody-based methods is yet to be determined. Whichever method is chosen, it is preferable to measure albumin in fresh samples[57].

‟For the diagnosis of microalbuminuria, a 24-h urine collection is the gold standard. Because of the effort involved, it is not the method of choice for screening”. The second best is a timed overnight urine collection. Again, because this requires collection of urine over a given time period, this may be acceptable for screening specific patient groups such as patients with diabetes or hypertension, but it is less feasible for population screening. The next best is a first-morning urine sample. ‟This has the advantage over a spot-urine sample because it is always performed at the same time of the day, and it is least influenced by hydration status and physical activity of the patient, reducing the variability that is caused by these factors’’

In clinical practice,The use of protein/creatinine (mg/mmol) ratio in single samples makes allowance for the variable degree of urinary dilution and can allow extrapolation of 24 hr values. Changes in this ratio give valuable information about the progression of renal disease.

To express albuminuria, preferably the excretion of albumin per unit of time should be used: UAE per 24 h or per minute (in case of timed overnight collections). For untimed samples, the albumin-to-creatinine ratio is advocated mos.

The albumin-to-creatinine ratio, however, introduces the need to use different definitions for an abnormal value for men and women. Moreover, creatinine excretion in the urine depends not only on gender but also on age and race. This may explain why urinary albumin concentration from a spot sample performs equally well for the definition of microalbuminuria as albumin-to-creatinine ratio.

Table-7: Classification of Abnormal Urinary Albumin

	24 hr urine albumin (mg/ 24 hr)	Overnight Urine Albumin (µg/min)	Spot urine			
			Albumin (mg/l)	Albumin/Creatinine ratio		
				Gender	mg/mmol	mg/g
Normal	<15	<10	<10	M	<1.25	<10
				F	<1.75	<15
High normal	15 to <30	10 to <20	10 to <20	M	1.25 to <2.5	10 to <20
				F	1.75 to <3.5	15 to <30
Microalbuminuria	30 to <300	20 to <200	20-<200	M	2.5 to 25	20 to <200
				F	3.5 to 35	30 to <300
Macroalbuminuria	>300	>200	>200	M	>25	>200
				F	>35	>300

Role of Microalbuminuria in Critically Ill Patients:

Different studies had been done regarding the usefulness of microalbuminuria in predicting the mortality in patients in critically ill patients.

Abid O et al[58] (2001) did a prospective study in ICU patients for determining the predictive value of microalbuminuria. They found out that patients with increasing trend of microalbuminuria has increased incidence of mortality (43%) compared with those with decreasing trend (15%). The APACHE II and SOFA score

were higher in the former group.‟ The negative predictive value of increasing microalbuminuria was 100% for the development of Acute Respiratory Failure and 96% for Multiple Organ Failure; the positive predictive value of increasing microalbuminuria was 57% for development of acute respiratory failure and 50% for multiple organ failure''.

The onset of microalbuminuria was rapid, with increased urinary albumin excretion observed on admission to ICU, with marked difference between survivors and non survivors, even 6 hr after admission, furthermore, the level of microalbuminuria correlated with the admission APACHE II and day 1 MODS. Spearman correlation coefficient between microalbuminuria: creatinine after 6, 12 and 18 hrs with APACHE II were 0.52, 0.59, 0.54 respectively (all $p<0.001$) and with day 1 MODS were 0.52, 0.59 and 0.46 (all $p \leq 0.002$). The mortality is more in severe microalbuminuria.

Thorevska et al[59] (2003), in which they measured serial spot urine albumin-creatinine ratio in 104 critically ill patients, with a median age of 64.5 yrs and median APACHE II and SOFA of 20.5 and 5 respectively. 69% of patient had microalbuminuria and clinical proteinuria and 43.3% had a albumin-creatinine ratio of $\geq$ 100 mg/g of admission. Overall mortality was 26.9% (28/104). Patient with albumin creatinine $\geq$ 100 mg/g were 2.7 times more likely to die compared with those with an albumin creatinine ratio < 100 mg/g, even after simultaneous adjustment for age, APACHE II, SOFA score. Overall, the albumin creatinine ratio shared similar prediction with APACHE II and SOFA.

S. Basu et al[60] (2010), conducted a study to evaluate microalbuminuria on admission and after 24 hr of admission to ICU and to predict outcome as well as APACHE II, severity illness score. Of the 238 patient, 196 survived while 42 died in

ICU. Non-survivors had significantly higher median ACR 2, Albumin creatinine ratio at 24 hr, [162.7 mg/g] in comparison to survivors who had a median ACR 2 [54.4 mg/g], ($p< 0.0001$). Median ACR 1, albumin creatinine ratio on, admission of non survivors (161.0 mg/g) was higher than median ACR 1 (80.4 mg/g) of survivors but failed to reach statistical significance ($p=0.00948$). ACR 2 was the best indicator of mortality.

ACR 2- sensitivity of 69%, specificity of 67%, positive predictive value of 31% and negative predictive value of 91% in predicting mortality in critically ill patients.

The usefulness of albumin creatinine ratio (ACR) as a predictor of mortality and whether there was a correlation between albumin creatinine ratio and PaO2/FiO2 ratio in patients with extensive burns. Maximum albumin creatinine ratio recorded for each was significantly higher in mortality group compared with those who survived. Out of the 21 patients 7 died. There was no correlation between albumin creatinine ratio and PaO2/FiO2.

In Non survivors there were 2 peaks in Albumin creatinine ratio. The early peak was at day 8-9 and a later peak at day 32. In Survivor group the concentration remained stable. The study concluded that albumin to creatinine ratio predicts mortality and ACR of >20mg/g is associated with poor outcome.

The calculated probability of death of patients with increasing ACR and suggested that a rapid indication of outcome can be predicted within 6 hr of ICU admission. Gosling et al[61] (2003) reported elevated ACR predicted death similar to APACHE II score. In septic surgical patient ACR correlates with SOFA. In septic surgicalpatients ACR continued to increase. Honarmond A et al[62] (2003) studied the incidence of presence of relationship between microalbuminuria and duration of mechanical ventilation in trauma ICU patient.

70% had microalbuminuria and 63.3% had ACR ≥ 100 mg/g on admission. The study confirmed that ACR can be used in estimating the risk of prolonged mechanical ventilation. Microalbuminuria has been found in different clinical settings by various authors. These are tabulated as follows:

A) Microalbuminuria in cardiac patients:

Year	**Author**	**Objectives**	**Conclusion**
1997	Berton et al[73]	Trend of	Significant increase of
		microalbuminuria after	microalbuminuria after AMI,
		AMI and correlation with	strong correlation between
		hospital mortality	microalbuminuria and hospital
			Mortality
2002	Yorgancioglu	Microalbuminuria and	Postoperative microalbuminuria
	et al[74]	postoperative outcome	increased significantly the
		after cardiac surgery	duration of ICU stay but not
			Mortality
2005	Koulouris et	Significance of	Significant increase of cardiac
	al[75]	microalbuminuria after	death and cardiac events 3 yr
		AMI	after AMI''

AMI- acute myocardial infarction

B) Microalbuminuria in medical and mixed patients

"Year	Author	Objectives	Conclusion
2001	Abid et al[58]	Predictive value of microalbuminuria on ARF and MOF	PPV of 57% for ARF and 50% for MOF, NPV of 100% for ARF and 96% for MOF
2003	Thorevska et al[59]	Correlation MACR- Mortality	MACR > 100 mg/g increased the risk of death of 2.7 times
2003	Gosling et al[61]	Correlation MACR- Mortality	MACR > 5.9 mg/mmol had sensitivity for death of 100% with specificity of 59%
2006	Gosling et al[76]	Correlation between MACR and SAPS II, APACHE II and Mortality	Significant correlation between MACR and SAPS II, APACHE II and mortality''

ARF- acute respiratory failure, MOF- multiple organ failure, MACR- microalbuminuria to creatinine ratio, PPV- positive predictive value, NPV- negative predictive value, APACHE- acute physiology and chronic health evaluation, SAPS- simplified acute physiology score.

MATERIALS AND METHODS

MATERIALS AND METHODS

In this study 98 critically ill patients, admitted in the Intensive Care Unit of BLDE UNIVERSITY ShriB.M.Patil medical collegeVijayapur during the period from October 2016 to September 2018. Patients or their close relatives were informed about the study and consent was taken from them for inclusion in the study.

Inclusion Criteria

Critically ill patients aged 18 years and above admitted to the Intensive Care Unit of the department of Medicine, BLDE UNIVERSITY Shri B.M.Patil medical college Vijayapur.

Exclusion Criteria

1. Patients with Anuria, frank hematuria
2. Patients with urinary infections
3. Patients with Diabetes Mellitus
4. Patients with CKD (serum creatinine level $\geq$ 2.0 mg/dl)
5. Patients who are on nephrotoxic drugs
6. Patient suffering from chronic organ insufficiency before this hospital admission according to APACHE II guidelines
7. Any post operative patients and patients admitted with Accidents/ trauma.

Urinary samples for microalbuminuria were collected at hospital admission and at 6,24hrs after hospital admission. The level of microalbuminuria, the urinary albumin:creatinine ratio was calculated.

‘‘The urinary volumes were recorded, together with blood samples, arterial blood gas analysis (PaO_2), and fraction of inspired oxygen (FiO_2)’’. The severity of illness was assessed by the APACHE (Acute physiology and chronic health evaluation) II. Similarly the degree of organ dysfunction was assessed using SOFA

(Sequential organ failure assessment) score, calculated from the time 6 hrs of admission and24 hrs of the hospital stay.

The patients were divided into 2 category:

Category-1: Patients with rising level of urinary microalbumin and urinary albumin to creatinine ratio.

Category-2: Patients with decreasing or stable urinary microalbumin and urinary albumin to creatinine ratio.

Patients who fulfilled the inclusion criteria were subjected to a detailed history physical examination was done according to the clinical requirement of the patients.

Following are the investigations done to the patients:

Investigations:

1. Urine sample for urine albumin creatinine ratio measurement of microalbuminuria at hospital admission and at 6,24hr after hospital admission.
2. Routine blood examination including Hb, TLC, DLC, ESR, Platelet count.
3. Random blood sugar and HbA_1C
4. Blood Culture and sensitivity
5. S.Electrolytes: Serum Na, Serum K, Serum Mg, Serum Ca, Serum Bicarbonate
6. Bleeding time and Clotting time
7. Prothombin time
8. Renal function tests including serum creatinine, blood urea, urine creatinine
9. Liver function tests (S. Bilirubin and fractions, AST, ALT and ALP)
10. Blood gas analysis: arterial blood gas data (PaO_2), and fraction of inspired oxygen (FiO_2)

11. Urine examination- physical, chemical, microscopic and culture sensitivity
12. Stool examination (in specifically indicated cases)
13. Chest X Ray
14. CSF analysis (in specifically indicated cases)
15. ECG
16. CT scan (in specifically indicated cases)
17. Calculation of APACHE II, and SOFA scores, based on data obtained from physical examination and laboratory investigations.

Serum Creatinne:

The creatinine method employs a modification of the kinetic Jaffe reaction by Larsren. This method has been reported to be less susceptible than conventional methods to interference from non-creatinine, Jaffe- positive compounds.

Principles of procedure:

In the presence of a strong base such as NaOH, picrate reacts with creatinine to form a red chromophore. The rate of increasing absorbance at 510 nm due to formation of this chromophore is directly proportional to the creatinine concentration in the sample and is measured using a bichromate (510,600 nm) rate technique. Bilirubin is oxidized by potassium ferricynide to prevent interference.

Creatinine + picrate → Redchromphore (absorbs at 510 nm) Assay Range: 0 – 20 mg/dl

Limitation of the procedure:

When serum creatinine concentration is more than 20 mg/dl, we have to dilute the sample, with purified water to obtain results within the assay range and have to add the dilution factor.

Reference Interval:

Male: 0.8 – 1.3 mg/dl

Female: 0.6 – 1.0 mg/dl

Measurement OfMicroalbuminuria:

Collection of sample Urinary samples were collected at hospital admission6, 24, hrs

Method used Immunoturbidimetric assay for urinary albumin

Analyser used Randoxautoanalyser

Principle:

Undiluted urine is added to the buffer containing antiboby specific for albumin. The absorbance (340 nm) of the resulting turbid solution is proportional to the concentration of the albumin in the sample urine. By constructing a standard curve from the absorbance of standards albumin concentration is determined. The assay is carried out normally at room temperature using an automated analyser.

Reagent composition:

1) Assay buffer:

- Polyethylene glycol : 6% w/v
- Tris/HCl buffer : 20 mmol
- NaCl : 150 mmol/l

2) Antibody reagent:

- Anti-human albumin : 20 mmol/l
- Tris/HCl buffer : 20 mmol
- NaCl: 150 mmol/l

3-8) Standards:

Contains human serum albumin : 0-200 µg/l

Assay limitation:

Sample concentration above 500 µg/l can be affected by prozone phenomenon which gives falsely low results. samples suspected to be having high concentration of albumin can be diluted with NaCl.

Sensitivity: Minimum level of albumin detectable with acceptable level of precision is 3.7 mg/l

Measurement of Urinary Creatinine:

Sample: The spot sample is diluted 49 times its volume with redistilled water

Method: Colorimetric method

Analyser: Randoxautoanalyser

Principle: Creatinine in alkaline solution reacts with picrate to form a colouredcomplex. The rate of formation of the complex is measured

Reagent composition:

R1 : NaOH : 0.2 mmol/l

R2 : Picric acid : 25 mmol/l

Interference: Interference is possible with high level of reducing substance. It can beeliminated by briefly boiling the urine sample.

Sensitivity: Minimum detectable concentration of creatinine with acceptable level of precision is determined as 27 µmol/l or 0.3 mg/dl.

Albumin Creatinine Ratio: ACR was then calculated

Normal Value: 30-300 mg/g of ACR is considered to be in Microalbuminuria range

Statistical analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square (χ^2)/ Freeman-Halton Fisher exact test was employed to determine the significance of differences between groups for categorical data. The difference of the means of analysis variables between two independent groups was tested by unpaired t test. The difference of the means of analysis variables between two time points in same group was tested by paired t test. Bivariate correlation analysis using Pearson's correlation coefficient (r) was used to test the strength and direction of relationships between the interval levels of variables. ROC analysis for Sensitivity- specificity was done to check relative efficiency. If the p-value was < 0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23.0. and Microsoft office.

OBSERVATION AND RESULT

OBSERVATION AND RESULT

TABLE: DISTRIBUTION OF CASES ACCORDING TO AGE

AGE (yrs)	N	%
18-30	18	18.4
31-40	7	7.1
41-50	18	18.4
51-60	17	17.3
>60	38	38.8
Total	98	100

As shown in the table,maximum age was > 60 years and minimum age was 18-30 years.

FIGURE: DISTRIBUTION OF CASES ACCORDING TO AGE

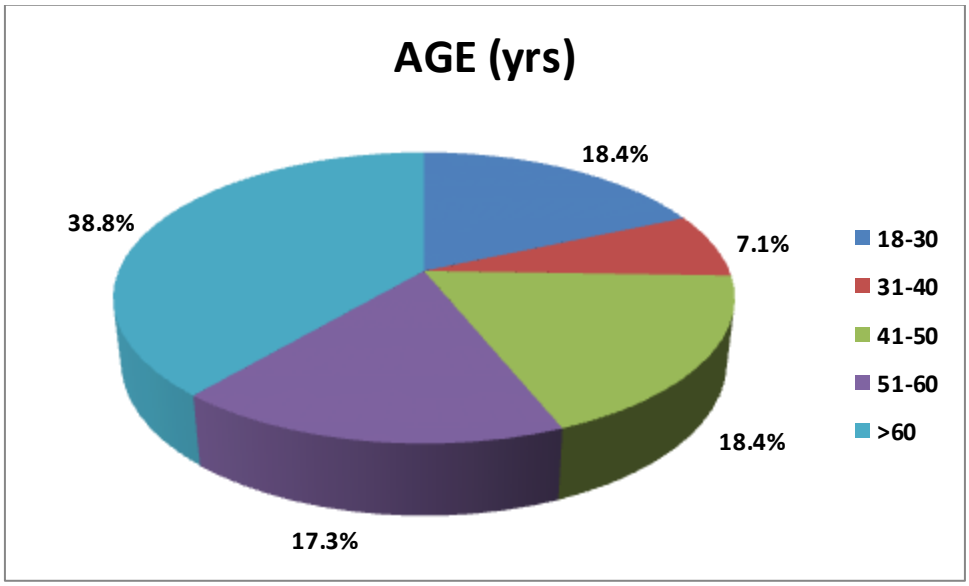


TABLE: DISTRIBUTION OF CASES ACCORDING TO SEX

SEX	N	%
Male	68	69.4
Female	30	30.6
Total	98	100

Male/female ratio=2.23:1

As seen in the table,out of 98 patients 68(69.4%) of the patients were males and 30 (30.6%) were female.

FIGURE: DISTRIBUTION OF CASES ACCORDING TO SEX

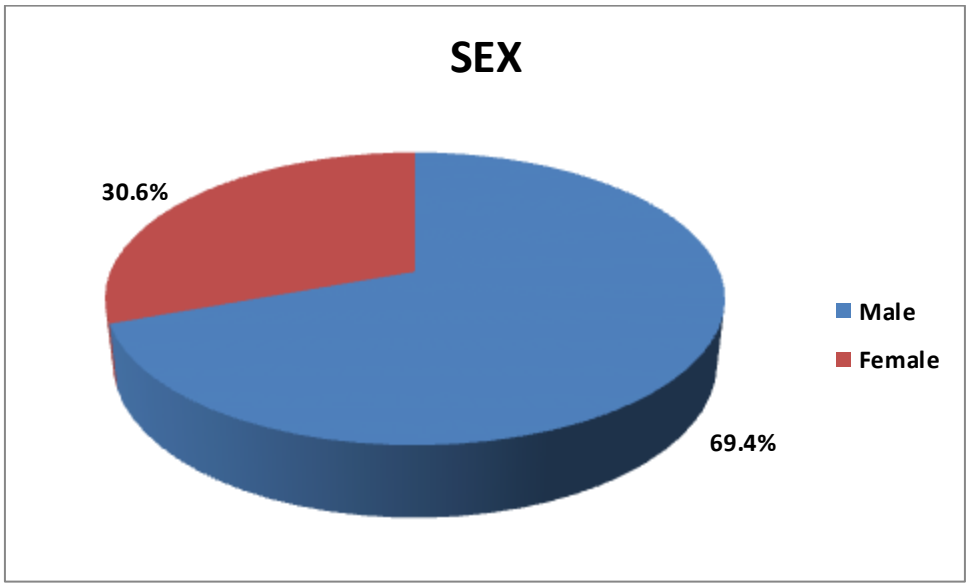


TABLE: ASSOCIATION OF AGE AND SEX

AGE (yrs)	Male		Female		p value
	N	%	N	%	
18-30	7	10.3	11	36.7	0.038*
31-40	5	7.4	2	6.7	
41-50	14	20.6	4	13.3	
51-60	12	17.6	5	16.7	
>60	30	44.1	8	26.7	
Total	68	100.0	30	100.0	

Note: * significant at 5% level of significance ($p<0.05$)

FIGURE: ASSOCIATION OF AGE AND SEX

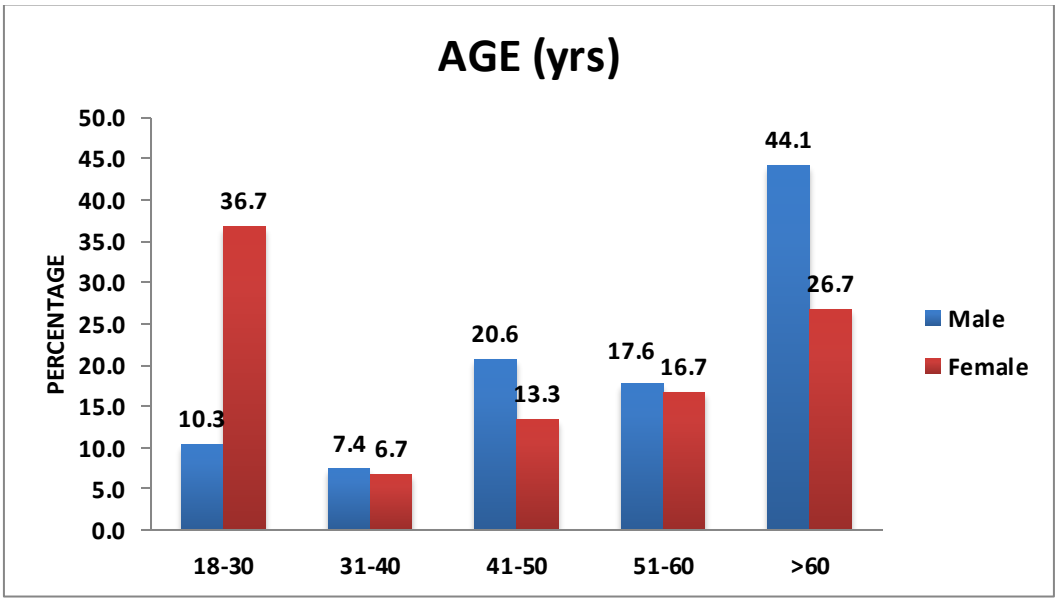


TABLE: DISTRIBUTION OF CASES ACCORDING TO PRESENTING SYMPTOMS

PRESENTING SYMPTOMS	N	%
CHEST PAIN	19	19.4
ALTERED SENSORIUM	31	31.6
DYSPENIA	32	32.7
COUGH	19	19.4
SEIZURE	9	9.2
LOC	12	12.2
FEVER	19	19.4
COSUMPTION OF POISON	8	8.2
HEMIPARESIS	7	7.1
Total	98	100

As seen in table, the patients presented a variety of signs and symptoms. The most common among them was Dyspenia32(32%) followed by altered sensorium 31(31.6%),fever,cough,chest pain19(19.4%).LOC 12(12.2%),seizure 9(9.2%),Consumption of poison8(8.2%),hemiparesis 7(7.1%).

FIGURE: DISTRIBUTION OF CASES ACCORDING TO PRESENTING SYMPTOMS

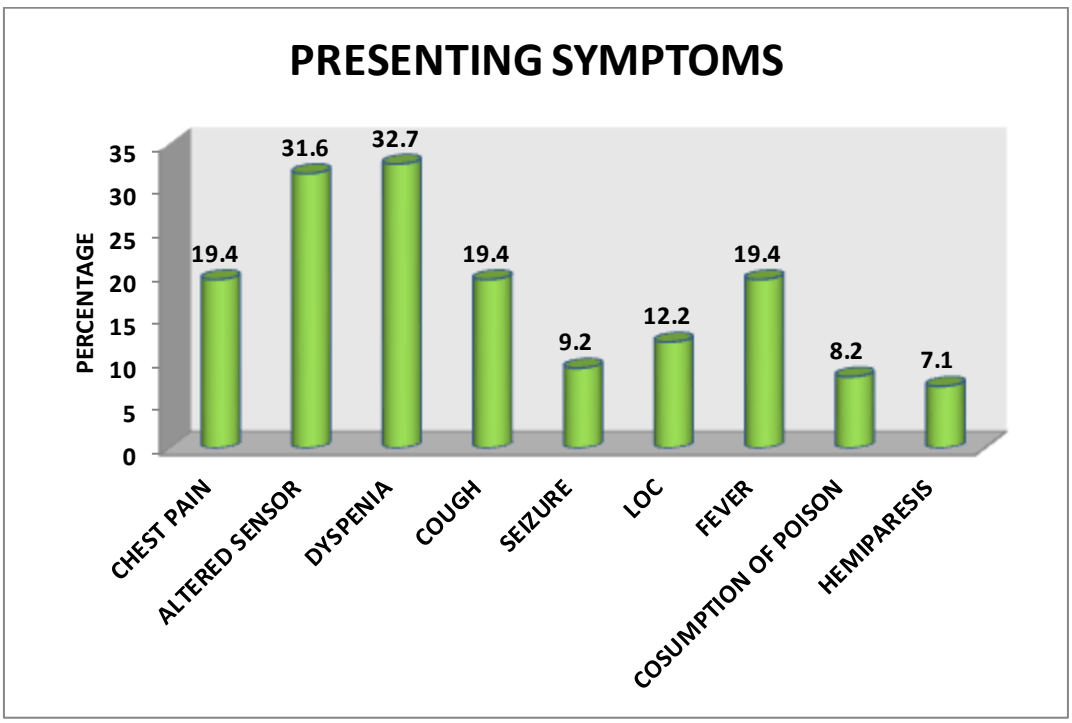


TABLE: DISTRIBUTION OF CASES ACCORDING TO CLINICAL OUTCOME

CLINICAL OUTCOME	N	%
DIED	47	48
SURVIVED	51	52
Total	98	100

As seen in table,out of 98 patients studied 51 (52%) survived,and47(48%)died during hospital stay.

FIGURE: DISTRIBUTION OF CASES ACCORDING TO CLINICAL OUTCOME

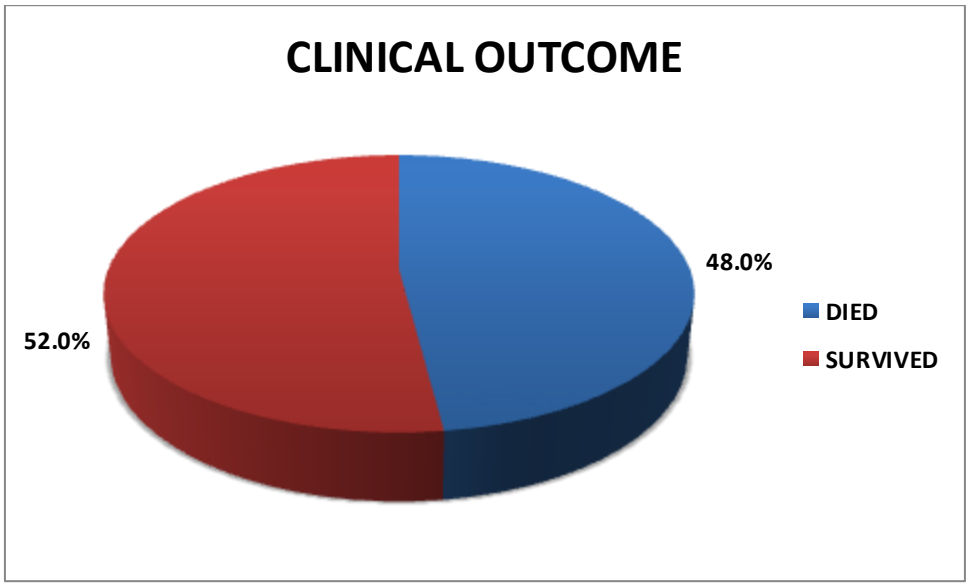


TABLE: DISTRIBUTION OF CASES ACCORDING TO DIAGNOSIS

DIAGNOSIS	SURVIVED		DIED		Total	
	N	%	N	%	N	%
CEREBREL MALARIA	0	0.0	1	2.1	1	1.0
CLD HE	3	5.9	4	8.5	7	7.1
COPD	5	9.8	8	17.0	13	13.3
CVA	9	17.6	9	19.1	18	18.4
LRTI	6	11.8	1	2.1	7	7.1
MI	11	21.6	6	12.8	17	17.3
OP POISON	8	15.7	3	6.4	11	11.2
SEIZURE DISORDER	6	11.8	1	2.1	7	7.1
SEPSIS	0	0.0	12	25.5	12	12.2
TBM	3	5.9	2	4.3	5	5.1
Total	51	100.0	47	100.0	98	100.0

As seen in table,the patients were diagnosed to be having the following disorders in order of decresing frequency, CVA 18(18.4%),MI 17(17.3%),COPD 13(13.3%), SEPSIS 12(12.2%),OP POISON 11(11.2%),LRTI,CLD WITH HE,SEIZURE DISORDER 7(7.1%),TBM 5 (5.1%),CEREBRAL MALARIA 1 (1%).

FIGURE: DISTRIBUTION OF CASES ACCORDING TO DIAGNOSIS

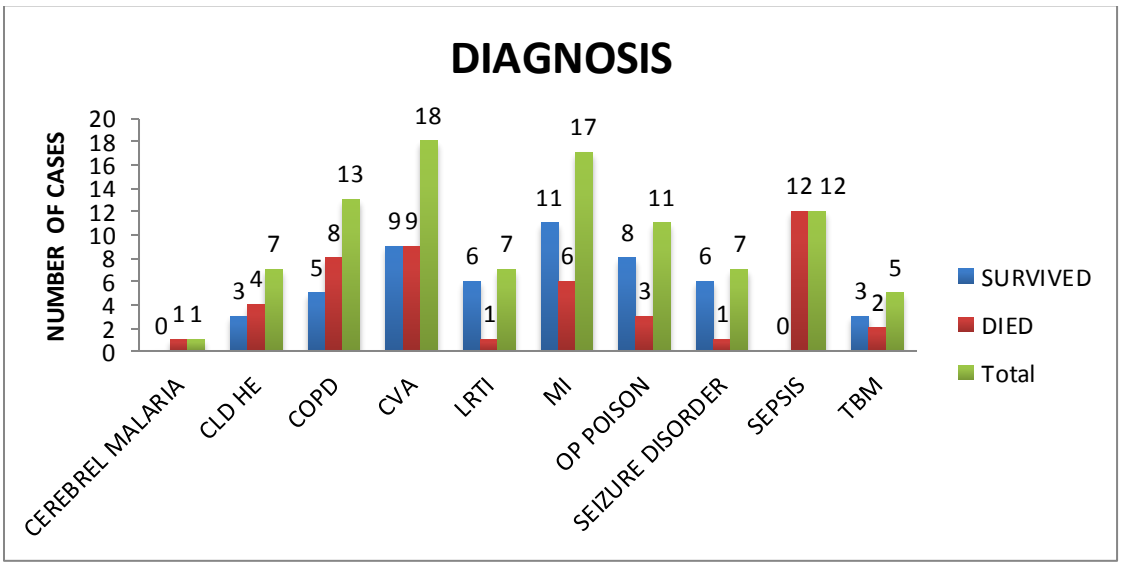


TABLE: DISTRIBUTION OF CASES ACCORDING TO CXR

CXR	N	%
CARDIOMEGALY	1	1
CONSOLIDATION	5	5.1
COPD CHANGES	10	10.2
EXTENSIVE PULMONARY TB	2	2
FIBROSIS	3	3.1
PLUERAL EFFUSION	5	5.1
PNEUMONIA	8	8.2
WNL	64	65.3
Total	98	100

FIGURE: DISTRIBUTION OF CASES ACCORDING TO CXR

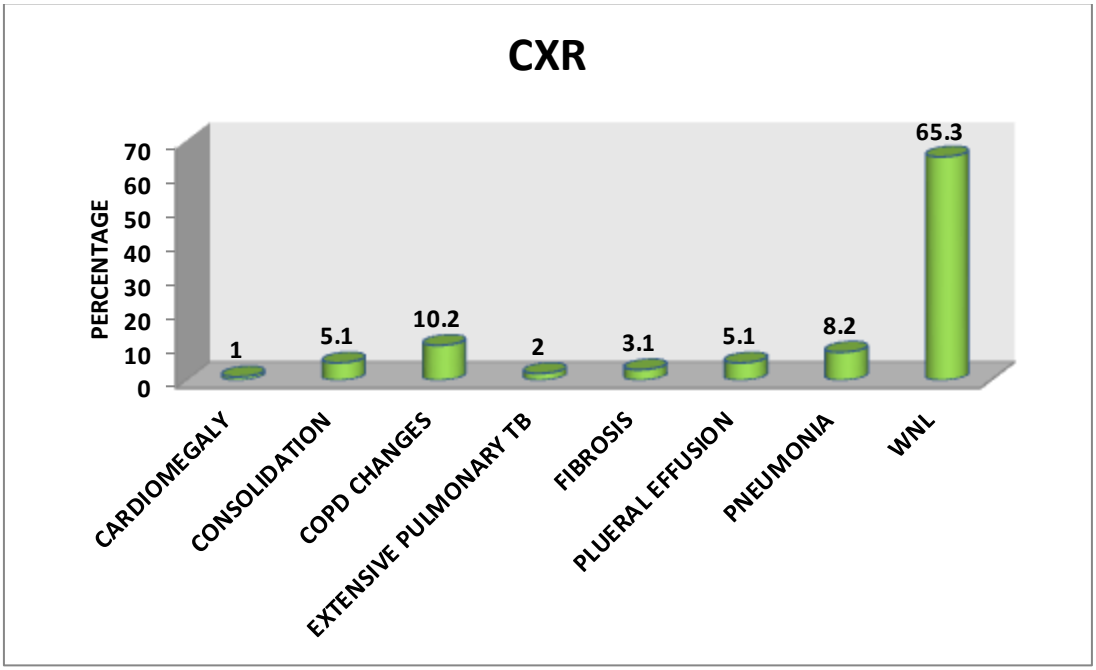


TABLE: DISTRIBUTION OF CASES ACCORDING TO ECG

ECG	N	%
P PULMONALE	1	1
PATHOLOGICAL Q WAVES PRESENT	1	1
Q WAVES IN II III AVF	1	1
ST DEPRESSION	4	4.1
ST DEPRESSION IN II III AVF	2	2
ST DEPRESSION V1,V6	1	1
ST ELEVATION II III AVF	1	1
ST ELEVATION INFERIOR WALL	3	3.1
ST ELEVATION MI	2	2
ST ELEVATION V1 TO V4	1	1
T WAVE INVERSION	1	1
WNL	80	81.6
Total	98	100

FIGURE: DISTRIBUTION OF CASES ACCORDING TO ECG

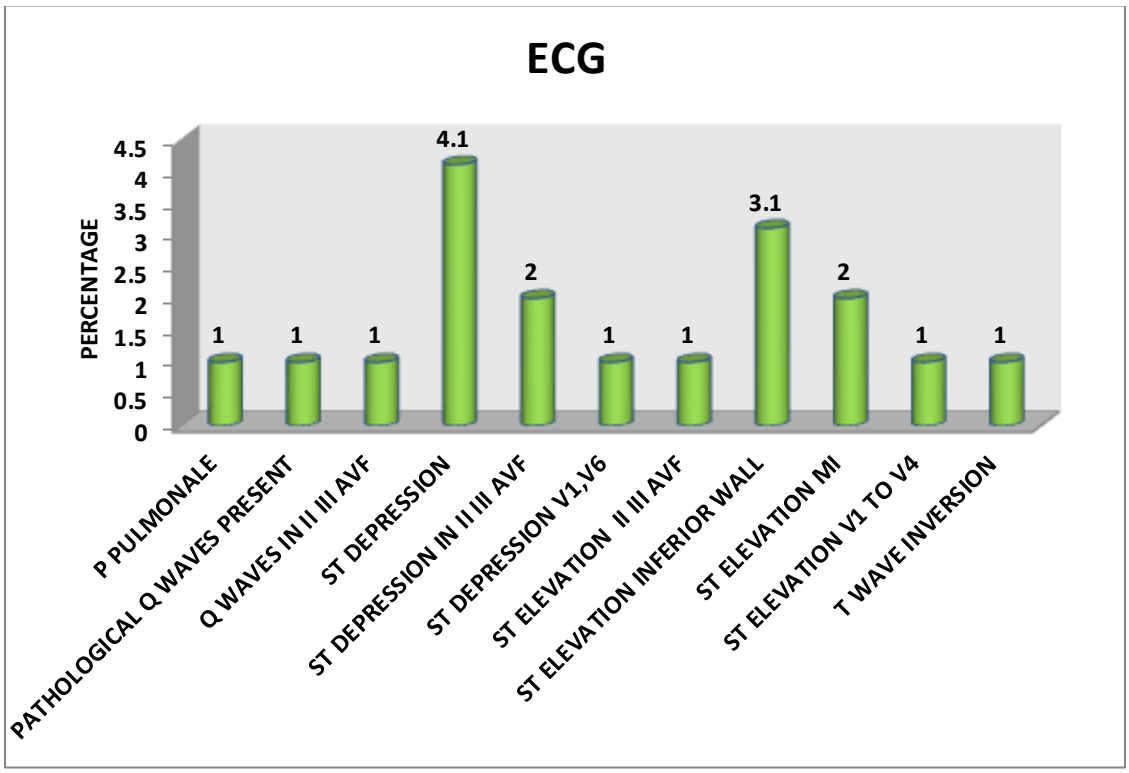


TABLE: DISTRIBUTION OF CASES ACCORDING TO 2D ECHO

2D ECHO	N	%
IHD	3	3.1
IHD EF 35	6	6.1
IHD EF 40	1	1
IHD EF 45	3	3.1
IHD EF 50	4	4.1
WNL	11	11.2

FIGURE: DISTRIBUTION OF CASES ACCORDING TO 2D ECHO

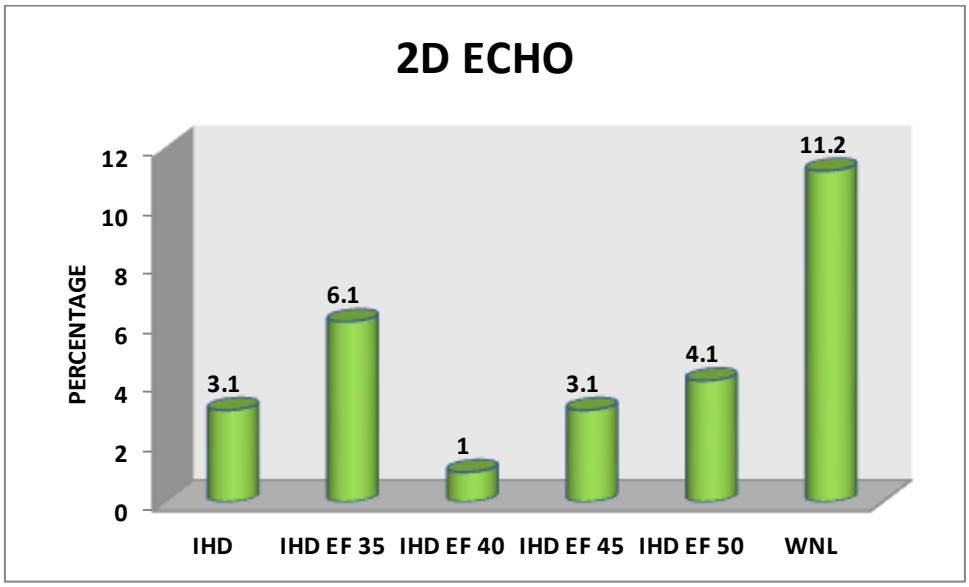


TABLE: DISTRIBUTION OF CASES ACCORDING TO CT

CT	N	%
ACUTE INFARCT IN RIGHT PARIETO REGION	12	12.2
GLIOSIS	3	3.1
IC BLEED	1	1
TBM	3	3.1
WNL	1	1

FIGURE: DISTRIBUTION OF CASES ACCORDING TO CT

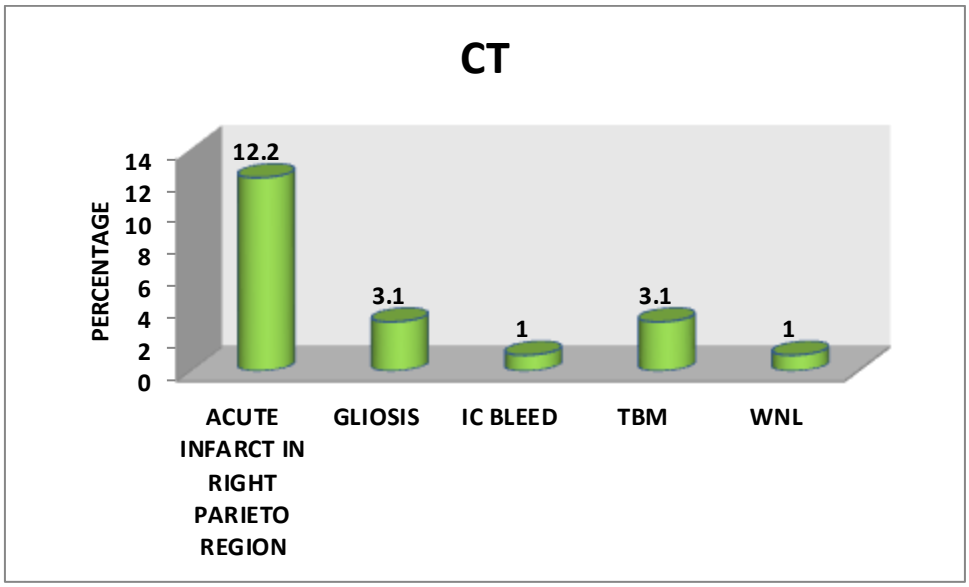


TABLE: ASSOCIATION OF AGE WITH OUTCOME

AGE (yrs)	SURVIVED		DIED		p value
	N	%	N	%	
18-30	10	19.6	8	17.0	0.606
31-40	5	9.8	2	4.3	
41-50	11	21.6	7	14.9	
51-60	8	15.7	9	19.1	
>60	17	33.3	21	44.7	
Total	51	100.0	47	100.0	

As seen in table maximum numbers of patients age group >60 years(44.7%) died, followed by 51-60yrs(19.1%),41-50 yrs(14.95).

FIGURE: ASSOCIATION OF AGE WITH OUTCOME

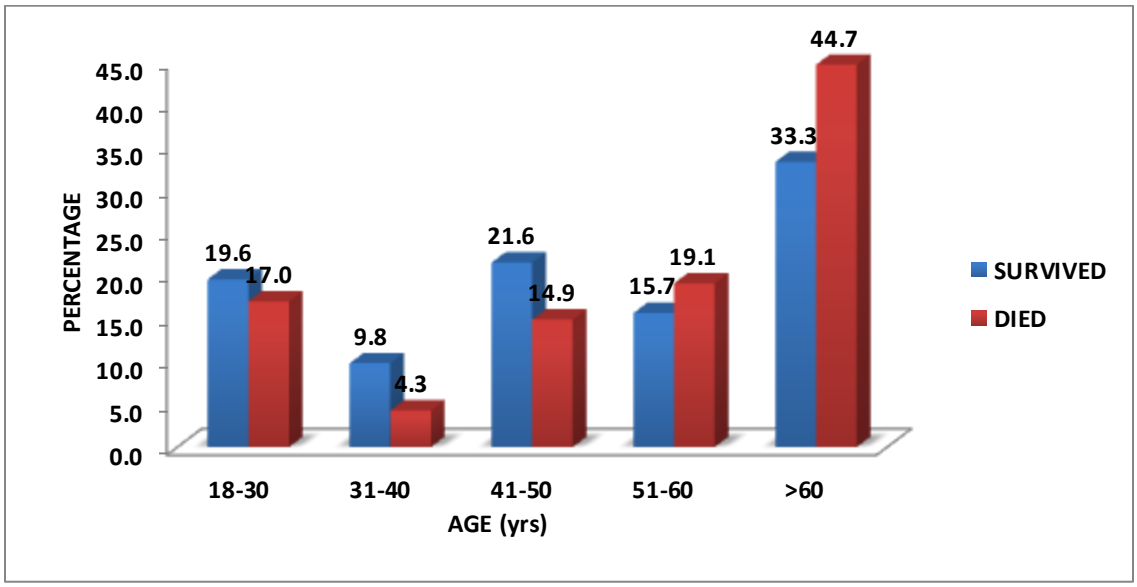


TABLE: ASSOCIATION OF SEX WITH OUTCOME

SEX	SURVIVED		DIED		p value
	N	%	N	%	
Male	32	62.7	36	76.6	0.137
Female	19	37.3	11	23.4	
Total	51	100.0	47	100.0	

As seen in table, male were 36(76.6%)died,female were 11(23.4%).

FIGURE: ASSOCIATION OF SEX WITH OUTCOME

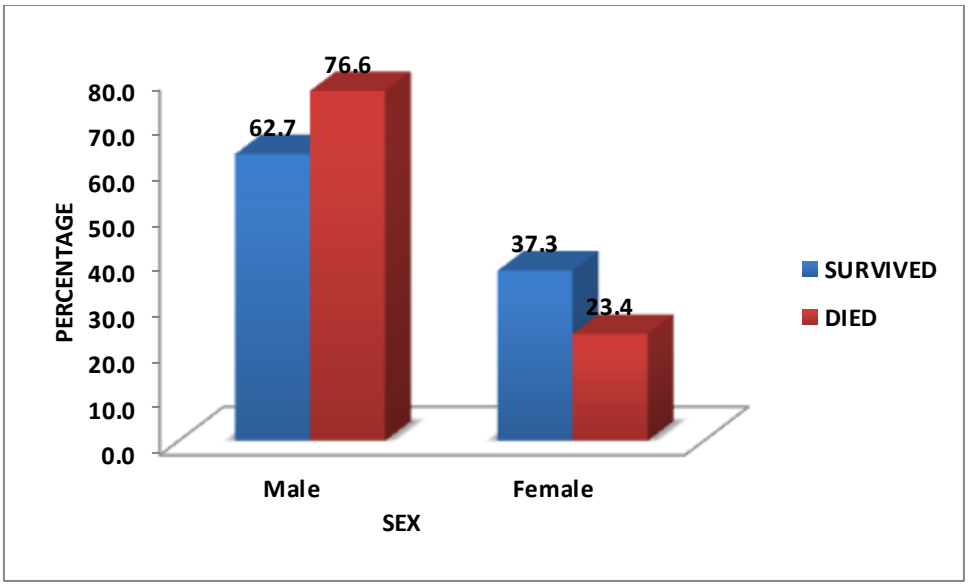


TABLE: ASSOCIATION OF DURATION OF STAY WITH OUTCOME

DURATION OF STAY	SURVIVED		DIED		p value
	N	%	N	%	
≤5	20	39.2	21	44.7	0.804
6-10	22	43.1	20	42.6	
11-15	6	11.8	3	6.4	
16-20	1	2.0	2	4.3	
>20	2	3.9	1	2.1	
Total	51	100.0	47	100.0	

AS seen in table,the maximum number of patients 42 belonged to the 6-10 days group,out of which 20(42.6%)died.followed by ≤5 days consisting of 41 patients with mortality of 44.7%,11-15 days consisting of 9 patients with mortality of 6.4% and >20 days with mortality rate of 2.1%.

FIGURE: ASSOCIATION OF DURATION OF STAY WITH OUTCOME

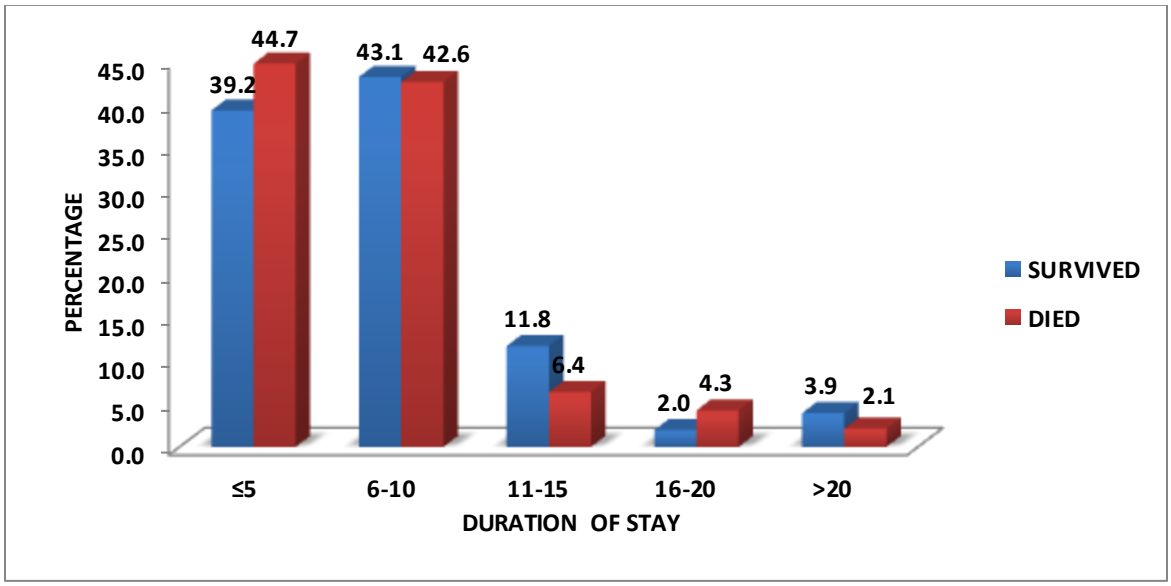


TABLE: ASSOCIATION OF PRESENTING SYMPTOMS WITH OUTCOME

PRESENTING SYMPTOMS	SURVIVED		DIED		p value
	N	%	N	%	
CHEST PAIN	9	17.6	10	21.3	0.65
ALTERED SENSORIUM	15	29.4	16	34.0	0.622
DYSPENIA	13	25.5	19	40.4	0.115
COUGH	11	21.6	8	17.0	0.569
SEIZURE	7	13.7	2	4.3	0.105
LOC	6	11.8	6	12.8	0.88
FEVER	9	17.6	10	21.3	0.65
COSUMPTION OF POISON	6	11.8	2	4.3	0.175
HEMIPARESIS	2	3.9	5	10.6	0.197
Total	51	100.0	47	100.0	

As seen in table,10(21.3%) of the19 chest pain patient died,out of 31 altered sensorium patients 16(34.0%) died.out of 32 dyspenia patients 19 (40%)died,out of 19 fever patients 10(21.3%) died, out of 18 cough patients 8(17.0%)did not survive,out of 12 LOC patients 6 (12.8%)died,out of 7 hemiparesis patients 5(10.6%) died,out of 8 poison patients 2(4.3%)died,out of 9 seizure patients 2(4.3%) died.

FIGURE: ASSOCIATION OF PRESENTING SYMPTOMS WITH OUTCOME

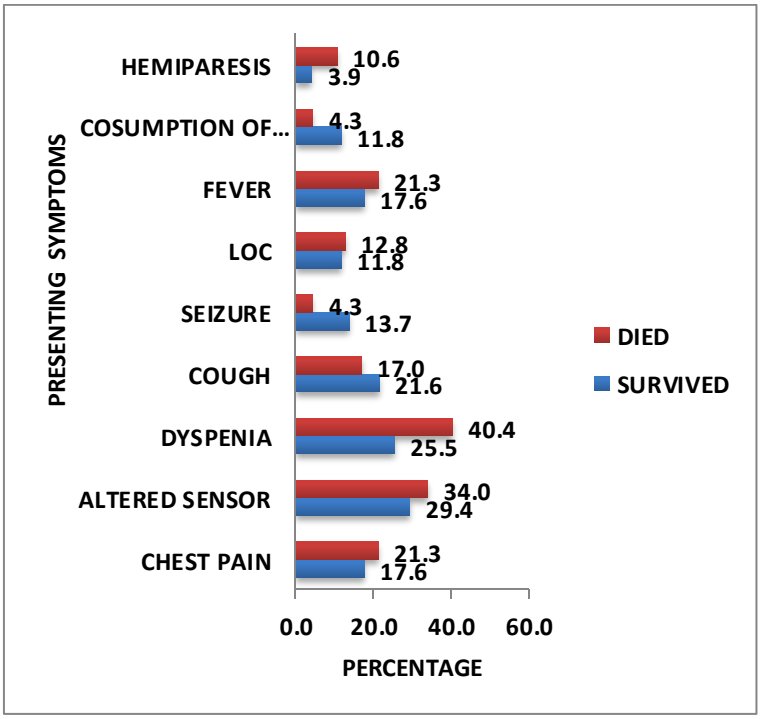


TABLE: PEARSON CORRELATION OF PARAMETERS WITH MICROALBUMIN ACCORDING TO OUTCOME

PARAMETERS	SURVIVED		DIED	
	r value	p value	r value	p value
GCS	-0.06	0.677	-0.01	0.949
APACHHE	-0.046	0.751	-0.025	0.867
SOFA	-0.015	0.916	0.101	0.499
CRT	0.12	0.402	-0.183	0.218
ACR	-0.231	0.104	0.019	0.897

TABLE: ASSOCIATION OF GCS SCORE WITH OUTCOME

GCS SCORE	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
<5	12	34.3	23	65.7	35	0.001*
5-10	29	54.7	24	45.3	53	
>10	10	100.0	0	0.0	10	
Total	51	52.0	47	48.0	98	

Note: * significant at 5% level of significance ($p<0.05$).As shown in table,among the patients studied the highest number of patients10(100%) who survived,had GCS score between >10,whereas the patients who had GCS score between 5-10 had mortality 45.3% and patients who had GCS score less then 5 had mortality 65.7%.

FIGURE: ASSOCIATION OF GCS SCORE WITH OUTCOME

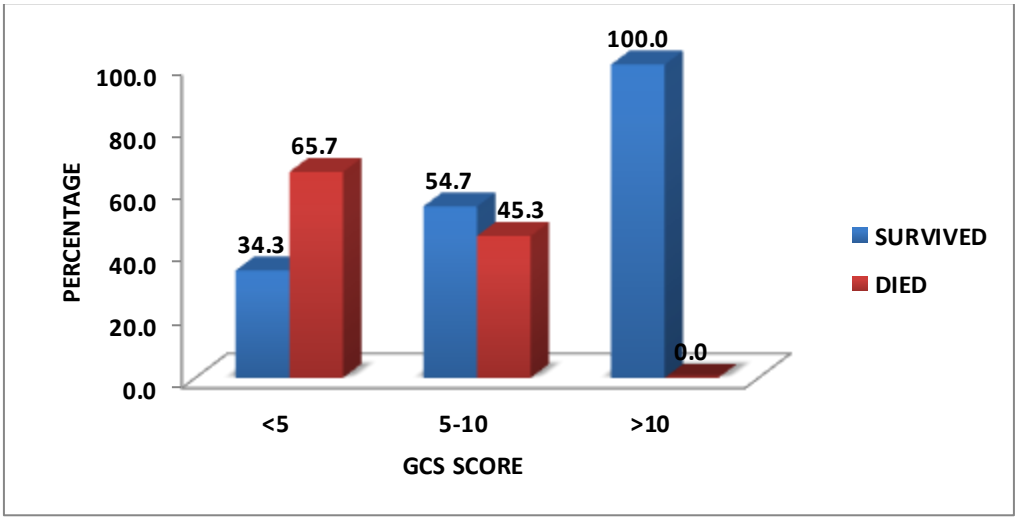


TABLE: MEAN GCS SCORE ACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
GCS SCORE	6 Hrs	7.5	3.4	5.4	2.0	0.001*
	24 Hrs	7.5	3.4	4.7	1.7	<0.001*

Note: * significant at 5% level of significance ($p<0.05$).As seen the table,that among the survivors,GCS score gradually increases over the period of time,where as among the non survivers it has decresing.

FIGURE: MEAN GCS SCORE ACCORDING TO OUTCOME

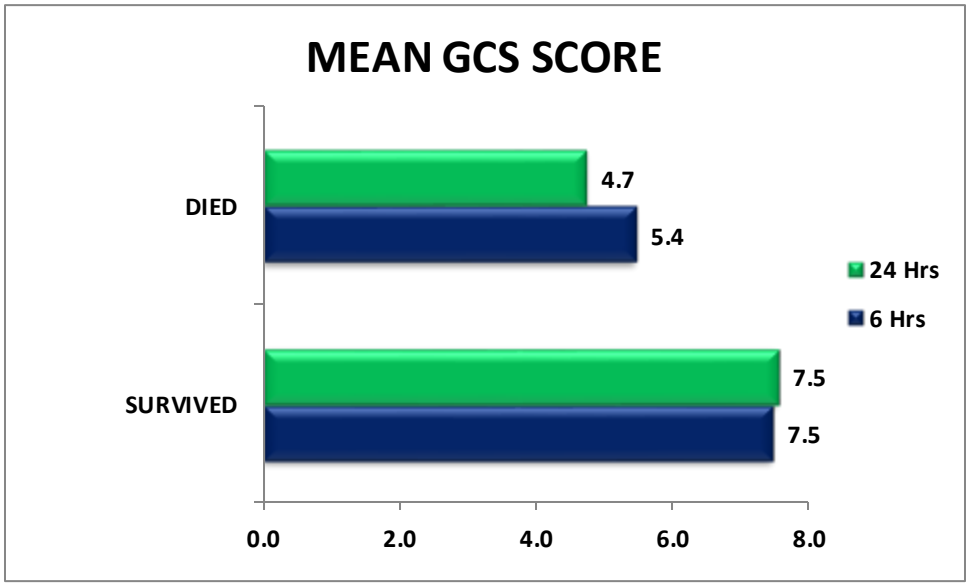


TABLE: ASSOCIATION OF APACHE SCORE WITH OUTCOME

APACHE II SCORE	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
≤10	3	5.9	1	2.1	4	0.767
11-20	31	60.8	29	61.7	60	
21-30	15	29.4	14	29.8	29	
>30	2	3.9	3	6.4	5	
Total	51	100.0	47	100.0	98	

As seen in table,3 patients who had an APACHE II score ≤10 survived,patients had an APACHE II score between 11-20 out of which 29 (61.7%)died.score between 21-30 out of which 14(29.8%)died.score >30 out of which 3(6.4%)died.

FIGURE: ASSOCIATION OF APACHE SCORE WITH OUTCOME

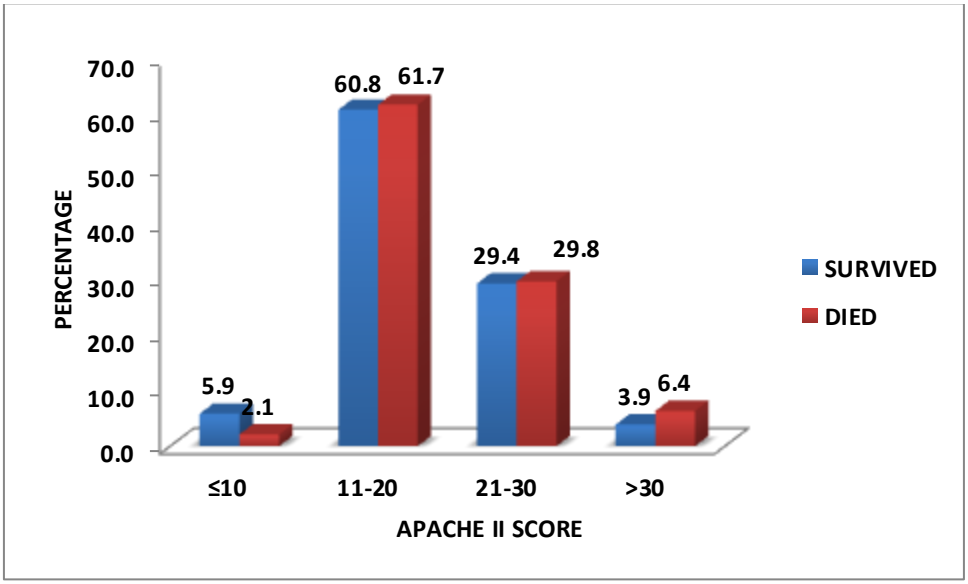


TABLE: MEAN APACHE SCORE ACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
APACHE II SCORE	6 Hrs	18.2	6.5	18.9	6.4	0.592
	24 Hrs	18.8	6.2	19.5	6.1	0.55

As seen table,it is observed that among the survivors ,the mean APACHE II Score is less where as among non survivors APACHE II score is more at 24 hrs.

FIGURE: MEAN APACHE SCORE ACCORDING TO OUTCOME

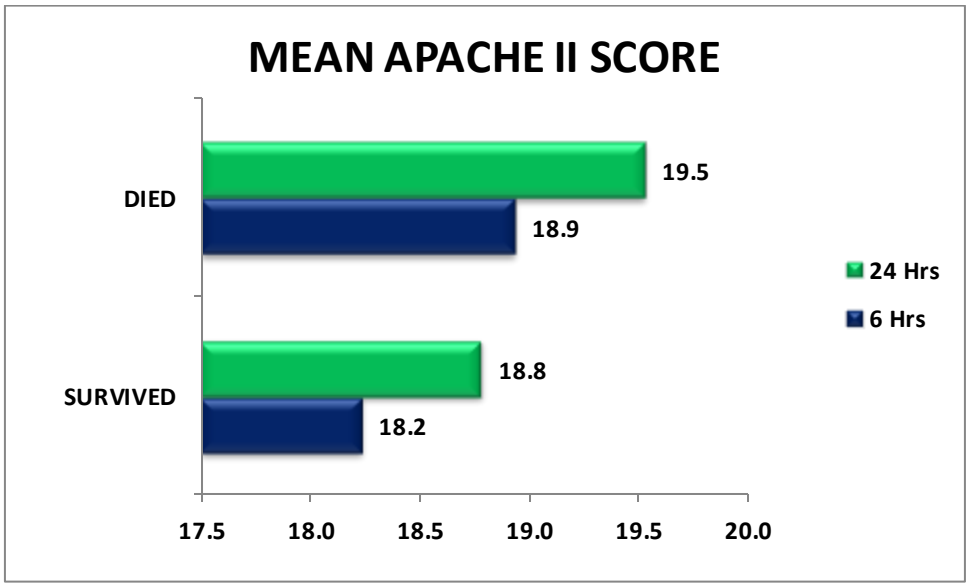


TABLE: ASSOCIATION OF SOFA SCORE WITH OUTCOME

SOFA SCORE	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
<5	2	100.0	0	0.0	2	<0.001*
5-10	38	66.7	19	33.3	57	
>10	11	28.2	28	71.8	39	
Total	51	52.0	47	48.0	98	

Note: * significant at 5% level of significance (p<0.05)

As seen in table,it has been observed that among the 2 patients who had a SOFA score <5 (100%) of them survived.patients had SOFA score between 5-10 out of 57 patients,19 (33.3%)died.SOFA score >10 out of 39 patients,28(71.8%)died.

FIGURE: ASSOCIATION OF SOFA SCORE WITH OUTCOME

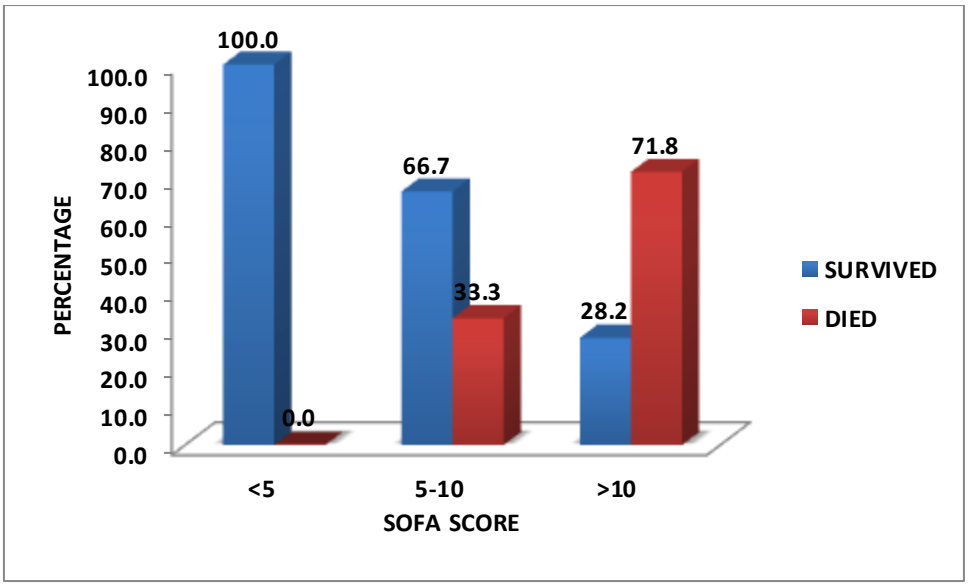


TABLE: MEAN SOFA SCORE ACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
SOFA SCORE	6 Hrs	8.4	2.5	9.9	1.9	0.001*
	24 Hrs	8.8	2.5	10.5	1.9	<0.001*

Note: * significant at 5% level of significance ($p<0.05$)

As shown in table,mean sofa score at 24 hrs p value<0.001 significant.

FIGURE: MEAN SOFA SCORE ACCORDING TO OUTCOME

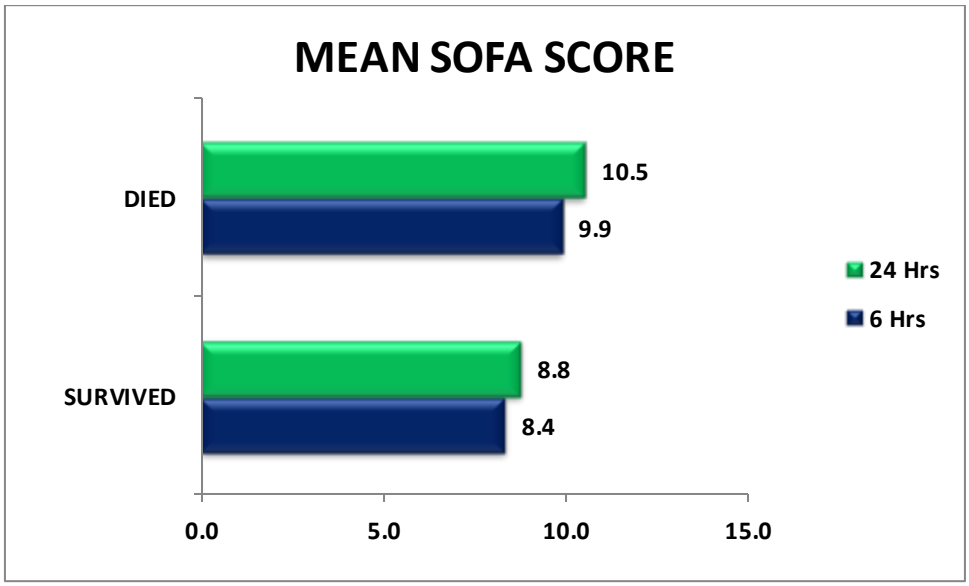


TABLE: ASSOCIATION OF URINARY MICROALBUMIN WITH OUTCOME

URINARY MICROALBUMIN	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
21-30	5	45.5	6	54.5	11	0.292
31-40	4	80.0	1	20.0	5	
41-50	7	77.8	2	22.2	9	
51-60	2	40.0	3	60.0	5	
61-70	10	66.7	5	33.3	15	
71-80	2	40.0	3	60.0	5	
81-90	2	22.2	7	77.8	9	
91-100	4	57.1	3	42.9	7	
>100	15	46.9	17	53.1	32	
Total	51	52.0	47	48.0	98	

As seen in table,the survival percentage is increased if the microalbumin level of the patients is less and decreased if the microalbumin level increases i.e microalbumin has inverse relationship with the prognosis of critically ill patients.11 patients had microalbumin level between 21-30µg/mg,out of which 6 (54.5%)died,5(45.5%)survived.32 patients had microalbumin level >100 out of which 17(53.1%) died,15(46.9%)survived.

FIGURE: ASSOCIATION OF URINARY MICROALBUMIN WITH OUTCOME

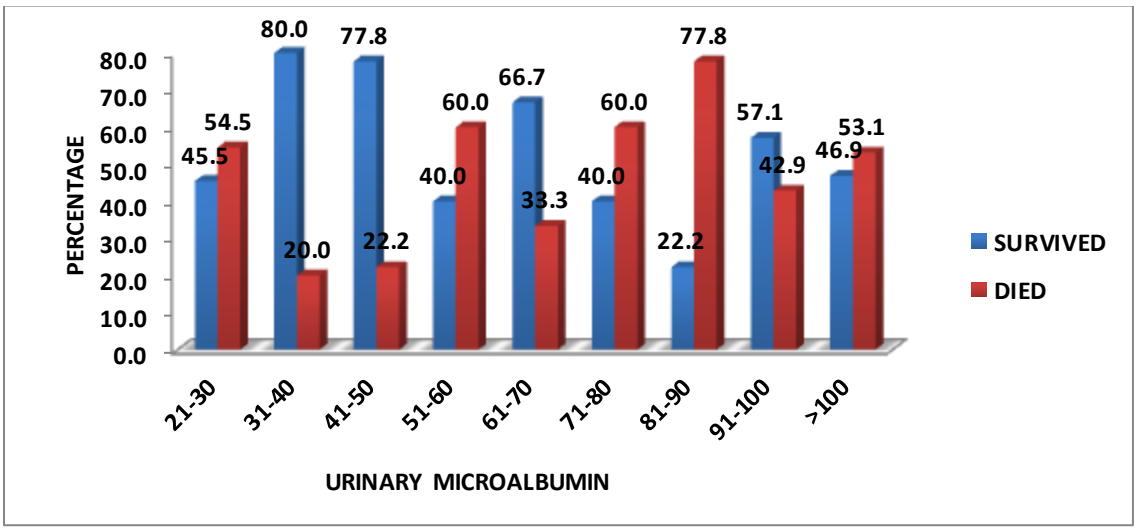


TABLE: MEAN URINARY MICROALBUMIN ACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
URINARY MICROALBUMIN	6 Hrs	84.9	73.5	113.7	126.6	0.168
	24 Hrs	96.1	81.4	114.9	99.2	0.308

As seen in table,survivor group has less microalbumin, whereas non survivor group has increased level of microalbumin.

FIGURE: MEAN URINARY MICROALBUMIN ACCORDING TO OUTCOME

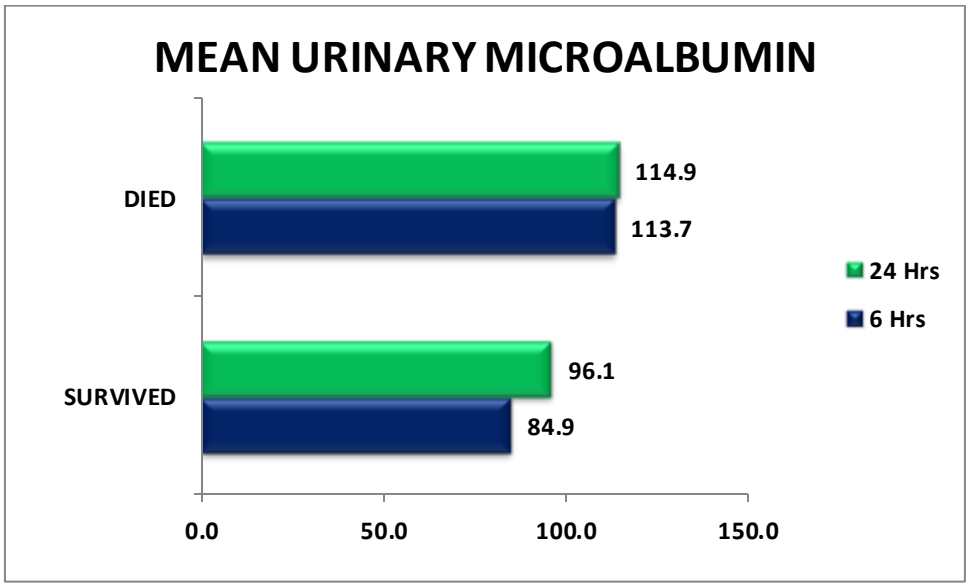


TABLE: ASSOCIATION OF URINARY CREATININE WITH OUTCOME

URINARY CREATININE	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
24-50	10	19.6	14	29.8	24	0.262
51-75	18	35.3	15	31.9	33	
76-100	15	29.4	9	19.1	24	
100-125	2	3.9	3	6.4	5	
126-150	0	0.0	3	6.4	3	
>150	6	11.8	3	6.4	9	
Total	51	100.0	47	100.0	98	

As seen in table,urinary creatinine between 24-50,out of 24 patients 14(29.8%) died,10 (19.6%)survived.urinary creatinine >150 out of 9 patients 3(6.4%)died,6(11.8%)survived.

FIGURE: ASSOCIATION OF URINARY CREATININE WITH OUTCOME

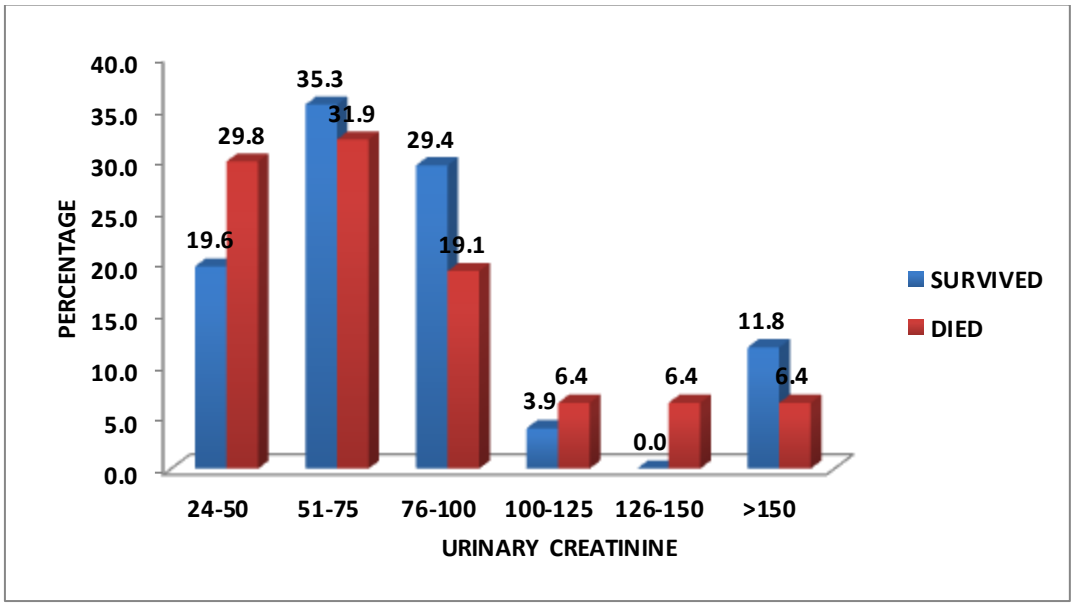


TABLE: MEAN URINARY CREATININE ACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
URINARY CREATININE	6 Hrs	76.3	46.1	80.6	54.8	0.674
	24 Hrs	87.1	55.8	81.4	46.8	0.588

FIGURE: MEAN URINARY CREATININE ACCORDING TO OUTCOME

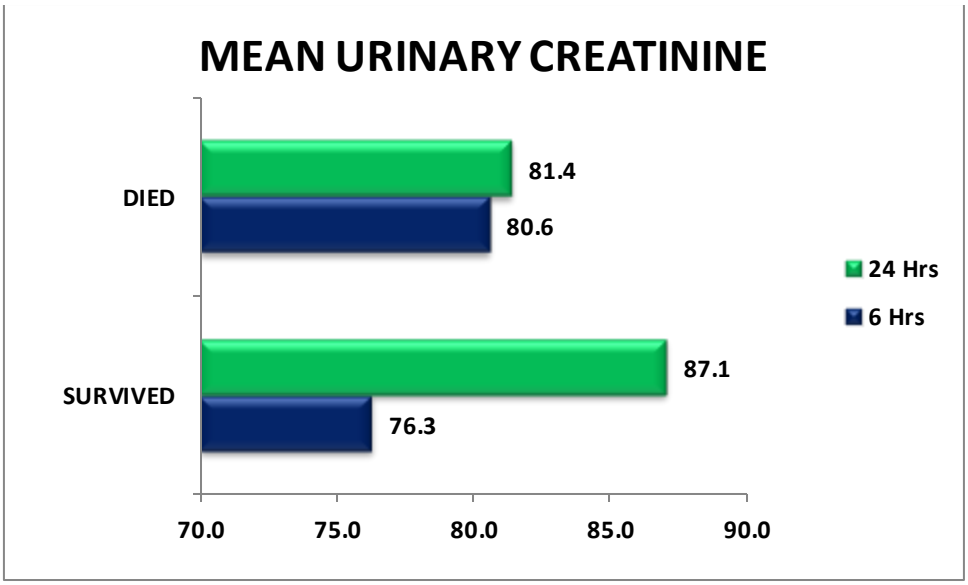


TABLE: ASSOCIATION OF URINARY ALBUMIN TO CREATININE RATIO WITH OUTCOME

URINARY ALBUMIN CREATININE RATIO	SURVIVED		DIED		TOTAL	p value
	N	%	N	%		
<30	14	100.0	0	0.0	14	<0.001*
31-50	19	57.6	14	42.4	33	
51-70	11	35.5	20	64.5	31	
71-90	5	29.4	12	70.6	17	
>90	2	66.7	1	33.3	3	
Total	51	52.0	47	48.0	98	

Note: * significant at 5% level of significance (p<0.05)

As shown in the table,albumin to creatinine ratio <30,out of 14 patients all are survived,albumin to creatine ratio between 71-90,out of 17 patients 12(70.6%)died and 5(29.4%)survived.

FIGURE: ASSOCIATION OF URINARY ALBUMIN CREATININE RATIO WITH OUTCOME

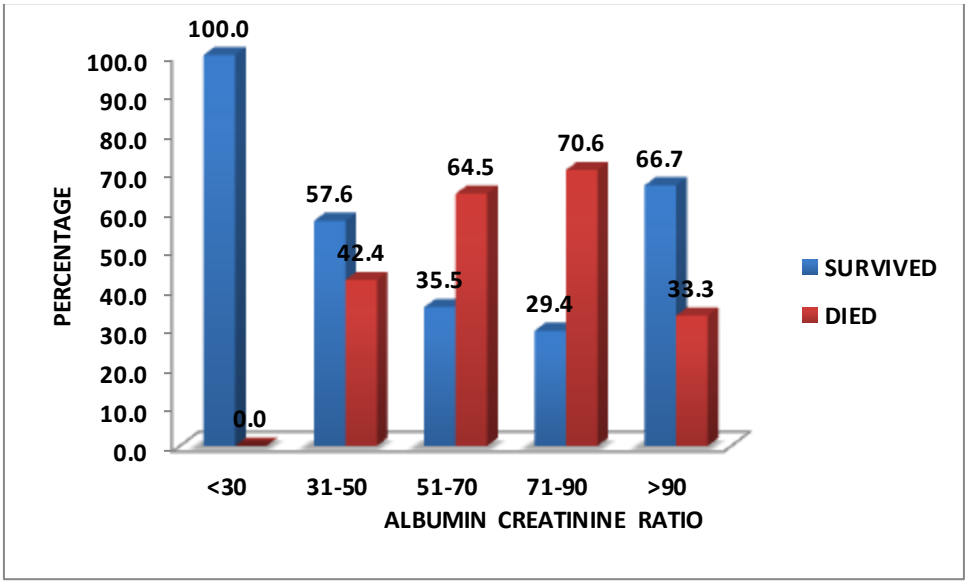


TABLE: MEAN URINARY ALBUMIN CREATININE RATIOACCORDING TO OUTCOME

PARAMETERS		SURVIVED		DIED		p value
		Mean	SD	Mean	SD	
URINARYALBUMIN TO CREATININE RATIO	6 Hrs	46.3	20.1	58.0	15.7	0.002*
	24 Hrs	50.5	21.0	63.8	15.7	0.001*

Note: * significant at 5% level of significance ($p<0.05$). p value significant at 24 hrs of Urinary albumin to creatinine ratio.

FIGURE: MEAN ALBUMIN CREATININE RATIOACCORDING TO OUTCOME

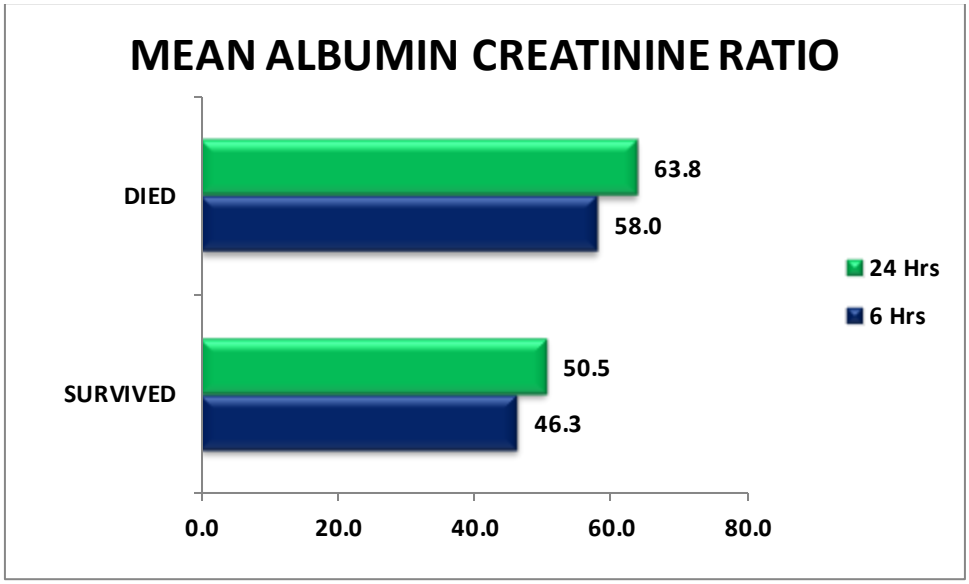


TABLE: ROC ANALYSIS OF PARAMETERS IN DETECTING DEATH

Test Variable(s)	Area Under the Curve	SE	p value	95% Confidence Interval	
GCS SCORE	0.564	0.058	0.275	0.45	0.678
APACHE II SCORE	0.525	0.059	0.67	0.41	0.64
SOFA SCORE	0.498	0.059	0.972	0.382	0.614
URINARY MICROALBUMIN	0.571	0.058	0.224	0.457	0.686
URINARY CREATININE	0.479	0.059	0.725	0.363	0.595
URINARY ALBUMIN CREATININE RATIO	0.722	0.052	<0.001*	0.62	0.825

Note: * significant at 5% level of significance ($p<0.05$)

As seen in table,Urinary albumin to creatinine ratio had p value <0.001 statistically significant compared with other parameters.

Test Variable(s)	Positive if Greater Than or Equal To	Sensitivity	Specificity
GCS SCORE	7.8	55.3%	52.9%
APACHE II SCORE	17.3	53.2%	51.0%
SOFA SCORE	7.8	61.7%	41.2%
URINARY MICROALBUMIN	77.0	57.4%	56.9%
URINARY CREATININE	68.8	46.8%	45.1%
URINARY ALBUMIN TO CREATININE RATIO	51.0	68.1%	64.7%

FIGURE: ROC CURVE OF PARAMETERS IN DETECTING DEATH

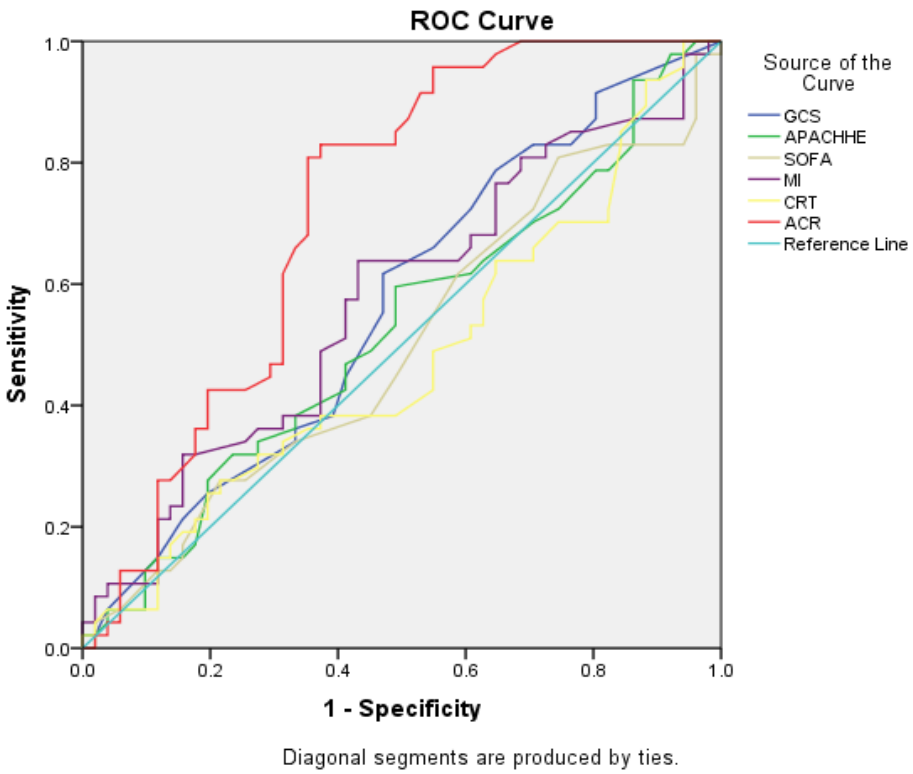


TABLE:PREVALENCE (%) OF MICROALBUMINARIA AND URINARY ALBUMIN TO CREATININE RATIO BY MAJOR DIAGNOSIS

MAJOR DIAGNOSIS	URINARY MICROALBUMIN (>30)		ALBUMIN CREATININE RATIO (>30)	
	NO OF PATIENTS	PREVALENCE (%)	NO OF PATIENTS	PREVALENCE (%)
CVA	17	94.4	17	94.4
MI	16	94.1	15	88.2
SEPSIS	9	75.0	12	100.0
OP POISON	11	100.0	6	54.5
COPD	11	84.6	10	76.9
ORGAN DISFUNCTION	42	89.4	44	93.6

As seen in table,prevalence of urinary microalbumin and Urinary albumin to creatinine ratio is 94.4% in CVA patients,wheras in MI patients urinary microalbumin 94.1%,urinary albumin to creatinine ratio 88.2%.in sepsis patients prevalence of microalbumin 75%,albumin to creatinine ratio 100%.in OP poison patients prevalence of microalbumin 100%,albumin to creatinine ratio 54.5%.in COPD patients prevalence of microalbumin 84.6%,albumin to creatinine ratio76.9%.prevalence of microalbumin 89.4%,albumin to creatinine ratio 93.6% in organ dysfunction patients.

TABLE:PREVALENCE (%) OF MICROALBUMINARIA AND ALBUMIN CREATININE RATIO BY MORTALITY AT 6 AND 24 HRS

PARAMETER		DIED (N=47)		SURVIVED (N=51)		Total		p value
		NO OF PATIENTS	PREVALENCE (%)	NO OF PATIENTS	PREVALENCE (%)	NO OF PATIENTS	PREVALENCE (%)	
URINARY MICROALBUMIN (>30)	6 Hrs	44	93.6	47	92.2	91	92.9	0.779
	24 Hrs	46	97.9	50	98.0	96	98.0	0.953
	OVERALL	41	87.2	46	90.2	87	88.8	0.643
ALBUMIN CREATININE RATIO (>30)	6 Hrs	45	95.7	41	80.4	86	87.8	<0.001*
	24 Hrs	46	97.9	47	92.2	93	94.9	0.028*
	OVERALL	46	97.9	38	74.5	84	85.7	<0.001*
Total		47	100.0	51	100.0	98	100.0	

Note: * significant at 5% level of significance ($p<0.05$)

Prevalence of urinary albumin to creatinine ratio significant at 24 hrs <0.001.

DISCUSSION

DISCUSSION

Assessing the severity of illness of patients is one of the important aspect of management of critically ill patients in high dependency care areas like ICUs. This is done both for the benefit of the patients and also in determining the optimum plan of management these patients. Hence many severity assessment scores have been developed including the APACHE, SOFA, score etc. Although these assessment scoring methods are objective and reproducible, they are sophisticated and utilize many clinical and laboratory parameters for assessing the severity states of the patients, and are also quite expensive.

" The physiologic responses of patients to various insults and interventions vary. The strength of initial predictions therefore, may be influenced by numerous factors during the course of hospitalization. These factors may not be accounted for in the initial assessment". Therefore, these prognosis scoring tools, which not only require the utility of expensive and sophisticated equipments, may also underestimate actual disease outcome in terms of morbidity and mortality.

Multiple system organ failure (MSOF), which is the ultimate hallmark of most critically ill patients, has been described as a sequential failure of the lungs, liver, kidney and other vital organ systems after a variety of acute physiological conditions such as severe infections and sepsis, pancreatitis, hemorrhagic shock, multiple trauma, etc . Although the mechanism involved in the development of this syndrome are not clear, it is proposed that MSOF after trauma, and

Severe acute systemic illnesses results from inflammatory reaction with activation of leucocytes and release of free radicals and other mediators, such as cytokines, from these cells which causes a rapid increase in urine albumin

(microalbumin) due to systemic vascular damage exemplified by capillary leak syndrome.

Hence, microalbuminuria has been considered a marker of vascular damage. "It is now considered that microalbuminuria is an important predictor for the development of diabetic nephropathy, characterized by proteinuria, increase BP, and decrease glomerular filtration rate". Microalbuminuria associated with Many acute inflammatory conditions. The rapid increase in renal permeability to plasma protein after trauma[61], ischemia[45], proportional to the severity of the insult, which led to the increased renal and vascular permeability occurs simultaneously.

Microalbuminuria, defined as 30-300 mg/day in a 24 hr collection or 30-300 µg/mg creatinine in a spot collection. It lasts for <2 days and has a rapid onset. "The level of microalbuminuria can be proportional to the severity of the illness".

Microalbuminuria is a simple, inexpensive, and prognostic tool for critically ill patients in intensive care units. It has been found to be is comparable with the other parameters like APACHE and SOFA. Microalbuminuria may be a simple, important and complementary method in assessing the severity and prognosis of patients admitted in the hospital and help in aggressively managing patients.

To determine the trend of increase or decrease in microalbumin level and for assessing the role of microalbuminuria as a prognostic tool in critically ill patients, we collected the urinary samples from the catheter of the patients at hospital admission, 6 hrs, and 24 hrs, after hospital admission. We also calculated the GCS score, APACHE II score and SOFA score at same interval of time.

Although all the patients with HTN,DM may have chronic microalbuminuria due to diabetic nephropathy, hypertensive nephropathy. Age, smoking, body mass index, altered lipid levels, salt sensitivity, endothelial dysfunction etc. may also

influence the development of microalbuminuria. "So it is important to evaluate the mean rather than a single value".

The results and observations of our study are discussed below and with relevant results found by other prominent authors:

1) Mortality rate:

Out of the 98 patients studied, there was a mortality rate of 48%.

K.L.MacKinnon et al[1] (2000) found the mortality rate to be 28% which is almost similar to our study

Abid et al[58] (2001) found the mortality rate to be 25%.

2) Age distribution and mortality rate:

In this study, we observed, There were 38% of patients in the age-group above 60 years followed by 18.4%, 17%, 7% and 16% in the age group 18-30 yrs and 41-50 yrs, 51-60 yrs and 31-40 yrs, respectively.

Patient with age group more than 60 had the highest mortality rate, out of 38 patients 68.7% died.

K. L. MacKinnon et al[1] (2000) found the median age to be 63 yrs and the non survivors were slightly older as a group

Abid et al[58] (2001) found the mean age to be 54 yrs.

3) Sex distribution and mortality rate:

In our study, out of the 98 patients studied 68 were males and 30 were females. Of the 68 male patients 76.6% of the patient died. The female group had mortality 23.7%.

K.L. MacKinnon et al[1] (2000) found the mortality rate among female 43% and 34.78% among males.

4) Duration of stay and mortality:

The mean duration of stay in the ICU was 8.8 days with a standard deviation of 4.98.

41 patients whose duration of stay was less than 5 days mortality rate 44.7%. 42.6% of the patient whose duration of stay was between 6-10 days and 6.4% of the patients who stay was between 11-15days and2.1% of the patients who stayed for more than 20 days died.

5) Presenting symptoms:

In our study the most common presenting symptom was dyspenia (40.4%), followed by altered sensorium (34%), chest pain (21.3%), fever (21.3%), cough (17%), loss of consciousness (12.8%), hemiparesis (10.6%), seizure (4.3%), consumption of poison (4.3%).

6) Diagnosis of the patients and mortality:

In this study we observed that, Cerebrovascular accidents (18.4%), followed by MI (17.3%), COPD (13.3%), Sepsis (12.2%), op poison(11.2%),LRTI (7.1%), chronic liver diseas with HE(7.1%), Seizure (7.1%),TBM (5.1%) and cerebral malaria(1%).

25.5% of Sepsis, 19.1% of CVA, 17.1% of COPD, 12.8% of MI and 8.5% of CLD,6.4% of OP POISON did not survive.

Abid et al[58] (2001) found the diagnosis of the patients in the following order: Polytrauma (20%), Cerebral hemorrhage (17.5%), bronchopneumonia (15%), status epilepticus (10%), pancreatitis (7.5%).

8) Organ dysfunction at the time of presentation:

In our study, 42% presented with multiorgan failure, 30% had acute respiratory failure and 25.5% had sepsis at the time of presentation.

Baue et al[78] (2010) found 32% with sepsis

Abid et al[58] (2001) found that 20% had ARF, 20% had MOF.

9) Prevalence of Microalbuminuria

In our study we found the prevalence of microalbuminuria in critically ill patients to be 92.9% at 6 hrs ,98% at 24 hrs of time of admission. Out of the 98 patients with microalbuminuria 91 (92.9%) had microalbuminuria at the 6 hrs of admission and 96(98%) at 24 hrs of admission.

Basu et al[60] (2010) found 78% of his study population had microalbuminuria initially.

10)Prevalence of Urinary albumin to creatinine ratio; Prevalence of ACR at 6 hrs 95.7%,97.9% at 24 hrs. Out of 98 patients 47 patients died.p value <0.001

11) GCS score and mortality

In our study we found that mortality was significantly higher in patients with a lower GCS score as compared to those with higer GCS scores. For example, in the patients with a GCS score below 5, the mortality was 65.7%, in the patients with GCS score of 5-10 had a mortality of 45.3% and patients with a GCS score >10 had a mortality of 0% ($p<0.05$) There was an increasing trend of mean GCS score in the patients who survived and a decreasing amongst those who did not.

12) APACHE II Score and Mortality

In our study we found that with increasing APACHE II score there was an increase in mortality. 4 patients with APACHE II less than 10 ,75% patients survived, 25% patient died.while 60 patients who had an APACHE II score of 11-20 ,29(48.3%) patients died. 29 patients who had APACHE II score of 21-30, 14 (48.3%) patients died.with an APACHE II score between >3ie0 ,3 (60%) patients died. Furthermore, the survivors had a decreasing score and non-survivors had a rising score of the APACHE II scores.

These findings correlated with the findings of other authors. Omar Abid et al[58] (2001) found that increase APACHE II score was significantly associated with

increasing microalbuminuria level. R. Martynoga et al[79] (2009) found that APACHE II score and age behaved as independent predictors of mortality, p-values being less than 0.0001 and less than 0.002 respectively.

13) SOFA Score and mortality

In our study we found that out of the 98 patients with SOFA score less than 5, 2 (100%) survived, p-value of which is <0.001 which is statistically significant. 19(33.3%) of 57 patient died who had a SOFA score between 5-10 the p-value being <0.001 which was statistically significant. Out of 39 patients,28(71.8%) with SOFA score between >10 did not survive. Furthermore with increasing SOFA score the mortality of the patients increased.

Similar findings have been observed by various other authors. Other study found that independent of the initial SOFA score and increase in SOFA score predicts mortality of atleast 50%

A mean SOFA average above 5 as well as SOFA variation within the first 72 hrs proved to be a good predictive marker in early patients with septic shock and severe sepsis.

Acharya et al[80] (2007) found that non-survivors had an initial high SOFA compared to that of survivors. Mean SOFA >11 has a predictive mortality of 87.5%.

14) Microalbuminuria,albumin to creatinine ratio and mortality

"Our study showed that the rise in microalbuminuria level and microalbumin to creatinine ratio at 6 hrs ,24 hrs of time in the patients was inversely proportional with survival and directly proportional to mortality".

11 patients had urinary microalbumin level between 21-30 or less. Four out of these 6 patients (54.5%) died,5 (45.5%) patients survived. On the other hand the mortality of the patients rose proportionately with higher level of urine microalbumin;

out of 32 patients 17(53.1%) patients who had microalbumin level ≥100 µg/mg did not survive.

14 patients had Urinary albumin to creatinine ratio <30,all are survived.those who had albumin to creatinine ratio 51-70,out of 31 patients 20(64.5%) died.albumin to creatinine ratio >90 who had ,mortality rate 33.3%.

In cardiac patients with acute myocardial infarction, microalbuminuria is correlated both with hospital mortality and outcome[75].

In medical ICU patients microalbuminuria 6 h after ICU admission is a strong predictor of ICU mortality and severity of illness[58,59,76,82].

Microalbuminuria as a predictor of severity of illness in ICU patients has been subjected to systematic review[82]. In quantifying microalbuminuria only a few studies used the albumin excretion rate while the great majority of the studies used the

MACR[61,69].

"Microalbuminuria is also seen in hypertensive and diabetic populations (10–40%)."The inter-individual variability in micro-albuminuria is high and already present just after birth indicating that microalbuminuria" is not only a consequence of vascular damage but also the result of the variability in endothelial function[52]".

Moreover probably cut-off values may vary among ICU patients depending on the specific disease, such as severe sepsis, acute myocardial infarction and CVA etc The trend during the first day of ICU stay is probably more important than any specific cut-off value (Abid O et al[58] 2001).

Studies investigating the correlation between MACR and illness severity, severity scores and ICU mortality inevitably moved towards higher values[61].

In 2001 Abid et al[58] didn't use any cut-off value, but they considered the trend of MACR over 48 h. Gosling et al[61] used a cut-off of 5.9 mg/mmol. A key feature of microalbuminuria is its low specificity and low positive predictive value. Using a lower cut-off value further decreases specificity and positive predictive value, whereas a higher cutoff value balances sensitivity and specificity increasing the positive predictive value[82].

"In clinical ICU practice the trend of microalbuminuriais more important[58]. The introduction of time as a variable poses problems as the timing of measurement is subject to debate[61,81]".

"The performance of microalbuminuria as a measurement varies with time. Eight hours after ICU admission sensitivity was 63% and specificity 73%, while at 18h after ICU admission they were, respectively 73% and 85%[69,82]".

"The outcome derives from the mean of MACR over the first few hours of intensive care. This will be condition and patient specific. These considerations have been recently confirmed by Gosling et al[76] (2006). They measured MACR in 450 critically ill patients within 15 min of ICU admission and after 4–6 h. Surgical and trauma patients showed the most consistent decreases in MACR after ICU admission, patients with respiratory failure showed less pronounced decreases and patients with heart failure didn't showed any decrease."

15) ROC and correlation between GCS score, APACHE II score, SOFAscore and microalbuminuria, microalbumin to creatinine ratio;

ROC and correlation analysis between microalbuminuria,urinary albumin to creatinine ratio and the GCS, APACHE II, SOFA scores were studied to find out whether there was any correlation between microalbuminuria,MCRT and these other variables in determining the prognosis of critically ill patients.

These analyses show that severity of the illness of both survivors and non-survivors as assessed by the level of microalbuminuria,microalbumin to creatinine ratio had a direct correlation with GCS score, APACHE II and SOFA scores. In the non-survivors, an increasing level of microalbuminuria,urinary albumin to creatinine ratio had a direct correlation with decreasing GCS scores andincreasing APACHE II score and SOFA score respectively. Similarly, in the survivors, a decreasing level of microalbuminuria,microalbumin to creatinine ratio had a direct correlation with an increasing GCS score and decreasing APACHE II score and SOFA score respectively.

SUMMARY

SUMMARY

- In the present study, serial microalbuminuria,urinary albumin to creatinine ratio estimation was carried out in 98 critically ill patients admitted to the ICU of Medicine Department, Shri B.M.PATIL BLDE UNIVERSITY and its prognostic role in determining severity of illness was compared with standard scoring tools like GCS, APACHE II and SOFA scores.
- The available literature in connection to microalbuminuria,microalbumin to creatinine ratio and its role in critically ill patients has been reviewed
- Detailed history, physical examination and laboratory investigations were done in all the patients
- The most common presenting symptom was dyspnea (72%), followed by altered sensorium, fever (52%), cough (28%), chest pain (32%), loss of
- consciousness (24%), seizure (24%), consumption of poison(18%), hemiparesis(16%) .
- 30% of the patients presented with acute respiratory failure, 42% had multiorgan failure and 25.5% had sepsis
- Microalbuminuria was measured by an Immunoturbidimetric assay in a spot sample and urinary creatinine was measured by calorimetric method. Albumin: creatinine ratio was measured.
- Microalbuminuria was present in 48% of the critically ill patients at the time of admission Of the 98 cases studied, 47 expired, with a mortality rate of 48%.
- **Prevalence of albumin to creatinine ratio;** Prevalence of ACR at 6 hrs 95.7%,97.9% at 24 hrs. Out of 98 patients 47 patients died.p value <0.0018%.

- There was a difference in mortality based on sex, survival rates in males and

females being respectively 44.7% and 26.7% (p>0.05)

- Survivors had an increasing trend of GCS while those who died had a decreasing trend.
- Survival was directly proportional to the GCS level; among the patients studied the highest number of patients10(100%) who survived,had GCS score between >10,whereas the patients who had GCS score between 5-10 had mortality 45.3% and patients who had GCS score less then 5 had mortality 65.7%,(p< 0.05).
- Among the survivors, both the APACHE II and SOFA scores had lower values at 6 hrs compared with at 24 hrs of admission.
- All the 5 patients with APACHE II score ≤10, which was significant(p=0.025).
- Patients with increasing SOFA score had a poor prognosis compared to those with a decreasing score.
- 100% of the patients with a SOFA score < 5 survived (p=0.001) whereas >71.8% patients with SOFA score between >10 expired.
- With a decreasing level of microalbuminuria, the chances of survival are increased whereas the prognosis is poor in those patients with an increasing trend.
- 45.5% of the patients with microalbuminuria level less than 30 µg/mg survived whereas 77.33% with microalbuminuria more than 90 did not.
- ROC analysis,in detecting mortality rate;GCS SCORE,APACHE II,SOFA SCORE,MICROALBUMIN LEVEL,ALBUMIN TO CREATININE RATIO p value being 0.275,0.67,0.972,0.224,<0.001 respectively.
- Among the survivors there was a significant correlation between decreasing

microalbuminuria,urinary albumin to creatinine ratio level and decreasing APACHE II and SOFA scores, and increasing GCS score, p- value being 0.0011, 0.002 and 0.0005 respectively.

- Among the non-survivors there was a significant correlation between increasing microalbuminuria,microalbumin to creatinine ratio level and increasing APACHE II and SOFA scores, and decreasing GCS score, p value being 0.0001, 0.0001 and 0.0001 respectively.

CONCLUSION

CONCLUSION

This study was carried out to find out the role of Urinary albumin to creatinine ratio as a predictor of prognosis in critically ill patients as compared to standard scoring methods like the Glasgow coma scale, APACHE II and SOFA scores.

There was significant correlation between Urinary albumin to urine creatinine ratio and the Glasgow Coma Scale, APACHE II and SOFA scores in predicting clinical outcome of the critically ill patients studied.

Hence Urinary albumin to creatinine ratio at 24 hurs may be considered as a predictor of outcome in critically ill patients.

Patient without significant Urinary albumin to creatinine ratio during first 6 hrs of ICU admission are less likely to have sepsis.At 24 hours ,absence of elevated levels of microalalbuminuria, urinary albumin to creatinine ratio is strongly predictive of ICU survival,equivalent to APACHE II,SOFA scores.

BIBLIOGRAPHY

BIBLIOGRAPHY

1) MacKinnon KL, Molnar Z, Lowe D, Watson ID, Shearer E. Use of microalbuminuria as a predictor of outcome in critically ill patients. Br J Anaesth 2000; 84:239–41.

2) Waydhays C. Equipment review. Intrahospital transport of critically ill patients. Crit Care Med 1999; 5: 83-89.

3) Bone RC, Balk RA, Cerra FB. Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committee. American College of Chest Physicians/Society of Critical Care Medicine. Chest. 1992; 101:1644-1655.

4) Bernard gr,rice tw,wheeler ap a randomised double blind placebo-controlled trail of TAK-242 for the treatment of severe sepsis.Crit care med 2010;38:1685

5) McCuskey RS, Urbaschek R, Urbaschek B. The microcirculation during endotoxemia. Cardiol Res 1996; 32: 752-63

6) Koj A. Initiation of acute phase response and synthesis of cytokines. Biochim Biophys Acta 1996; 1317: 84-94

7) Pinsky MR, Vincent JL, Deviere J, Alegre M, Kahn RJ, Dupont E: Serum cytokine levels in human septic shock. Relation to multiple-system organ failure and mortality. Chest 1993; 103: 565-75

8) Casey LC, Balk RA, Bone RC. Plasma cytokines and endotoxin levels correlate with survival in patients with the sepsis syndrome. Ann InternMed 1993; 119: 771-8.

9) Paterson RL, Galley HF, Webster NR. Nuclear factor KB activation in the critically ill. Br J Anaesth 1998; 81: 285-6P

10) Gerard C et al. Interleukin-10 reduces the release of tumor necrosis factor and prevents lethality in experimental endotoxemia. J Exp Med 1993; 177: 547-50

11) Standiford TJ, Strieter RM, Lukacs NW, Kunkel SL. Neutralization of IL-10 increases lethality in endotoxemia. J Immunol 1995; 155: 2222-9

12) Lehmann AK, Halstensen A, Sornes S, et al. High levels of interleukin-10 in serum are associated with fatality in meningococcal disease. Infect Immune. 1995; 63: 2109-12

13) Donnelly SC, Strieter RM, Kunkel SL. Interleukin-8 and development of adult respiratory distress syndrome in at risk patient groups. Lancet 1993; 341: 643-7.

14) Xu H, Gonzalo JA, Pierre YS, et al. Leukocytosis and resistance to septic shock in intercellular adhesion molecule 1 deficient mice. J Exp Med 1994; 180: 95-109

15) Cowley HC, Heney D, Gearing AJ et al. Increased circulating adhesion molecules concentration in patients with the systemic inflammatory response syndrome: a prospective cohort study. Crit Care Med 1994; 22: 651-7.

16) Moss M, Gillespie MK, Ackerson L, Moore FA, Moore EE, Parsons PE. Endothelial cell activity varies in patients at risk for the adult respiratory distress syndrome. Crit Care Med 1996; 24: 1782-6

17) Kollef MH, Schuster DP. The acute respiratory distress syndrome. New Engl J Med 1995; 332: 27-37

18) Rees DD, Monkhouse JE, Cambridge D, Moncada S. The role of nitric oxide in a conscious mouse model of endo-toxin shock. Br JPharmacol 1995; 114: 123P

19) Grover R, Lopez A, Lorente J. Multi-center, randomized, placebo-controlled,

double blind study of the nitric oxide synthase inhibitor 546C88: effect on survival in patients with septic shock. Crit Care Med 1999; 27: A33

20) Grocott-Masson RM, Shah AM. Cardiac dysfunction in sepsis: new theories and clinical implications. Intensive Care Med 1998; 24: 286-95

21) Poderoso JJ, Carreras MC, Lisdero C. Nitric oxide inhibits electron transfer and increases superoxide radical production in rat mitochondria and submitochondrial particles. Arch Biochem Biophys1996; 328: 85-92

22) Thijs A, Thijs LG. Pathogenesis of renal failure in sepsis. Kidney Int 1998; 53: S34-37.

23) Neumann F, Ott I, Marx N, et al. Effect of human recombinant interleukin-6 and interleukin-8 on monocyte procoagulant activity. Arterioscler Thromb Vasc Biol 1997; 17: 3399-405.

24) Pittet D, Rangel-Fausto MS, Li N. Systemic inflammatory response syndrome, sepsis, severe sepsis and septic shock: incidence, morbidities and outcomes in surgical ICU patients. Int Care Med. 1995; 21:302-309.

25) Rangel-Fausto MS, Pittet D, Costigan M. The natural history of the systemic inflammatory response syndrome (SIRS). A prospective study. JAMA. 1995; 273:117-123.

26) Zhang Z, Lu B, Ni H, Sheng X, Jin N.Department of Critical Care Medicine, Jinhua Municipal Central Hospital, Jinhua, Zhejiang Province - PR China. Microalbuminuria can predict the development of acute kidney injury in critically ill septic patients. Journal of nephrology, (impact factor: 1.65).01/2012; DOI:10.5301/jn.5000231

27) Shapiro N, Howell MD, Bates DW. The association of sepsis syndrome and organ dysfunction with mortality in emergency department patients with

suspected infection. Ann Emerg Med. 2006; 48:583-590.

28) Heffner AC, Horton JM, Marchick MR, Jones AE. Etiology of illness in patients with severe sepsis admitted to the hospital from the emergency department Clin Infect Dis. Mar 15 2010; 50(6):814-20.

29) Comstedt P, Storgaard M, Lassen AT. The Systemic Inflammatory Response Syndrome (SIRS) in acutely hospitalised medical patients: a cohortstudy. Scand J Trauma Resusc Emerg Med. Dec 27 2009; 17(1):67.

30) Romundstad S, Holmen J, Kvenild K, Hallan H, Ellekjaer H: Microalbuminuria and all-cause mortality in 2,089 apparently healthy individuals: A 4.4-year follow up study.The Nord-Trondelag Health Study (HUNT), Norway. Am J Kidney Dis 42: 466–473, 2003

31) Yuyun MF, Khaw KT, Luben R, Welch A, Bingham S, Day NE, Wareham NJ: Microalbuminuria independently predicts all-cause and cardiovascular mortality in a British population: The European Prospective Investigation into Cancer in Norfolk (EPIC-Norfolk) population study. Int J Epidemiol 33: 189–198, 2004.

32) Klausen K, Borch-Johnsen K, Feldt-Rasmussen B, Jensen G,Clausen P, Scharling H, Appleyard M, Jensen JS: Very low levels of microalbuminuria are associated with increased risk of coronary heart disease and death independently of renal function, hypertension, and diabetes. Circulation 110: 32–35, 2004

33) PE, Gansevoort RT:Urinary albumin excretion and its relation with C-reactive protein and themetabolic syndrome in the 1). Brantsma AH, Bakker SJ, Hillege HL, de Zeeuw D, de Jong prediction of type 2 diabetes. Diabetes Care 28:2525–2530, 2005

34) Brantsma AH, Bakker SJ, Hillege HL, de Zeeuw D, de Jong PE, Gansevoort RT: Urinary albumin excretion and its relation with C-reactive protein and the metabolic syndrome in the prediction of type 2 diabetes. Diabetes Care 28: 2525–2530, 2005

35) Bhadade R R, deSouza R, Harde M J, Sridhar B. Microalbuminuria: A biomarker of sepsis and efficacy of treatment in patients admitted to a medical intensive care unit of a tertiary referral center. J Postgrad Med 2014;60:145-50

36) Drumheller BC, McGrath M, Matsuura AC, Gaieski DF Point-of-care urine albumin:creatinine ratio is associated with outcome in emergency department patients with sepsis: a pilot study Department of Emergency Medicine, Boston Medical Center, MA, USA. 2012 Mar;19(3):259-64. doi: 10.1111/j.1553-2712.2011.01266.x.

37) Azim Honarmand, Mohammadreza safavi, Keivan baghery, Ali monayezi The association of microalbuminuria and duration of mechanical ventilation in critically ill trauma patients *Turkish Journal of Trauma & Emergency Surgery* 2009;15(1):12-18

38) Ms. Bhavita Patel 1*, Dr. H. B. Sirajwala 2, Dr. Dilip Taviad 3, Dr. (Mrs.) R. M. Shah 4, Dr. Rinku Makadiya 5. Microalbuminuria: A Marker Of Critically Ill Patients. I.J.A.B.M.S. July 2013.

39) de Wardener HE. The Kidney. Edinburgh: Churchill Livingstone, 1985: 49-50.

40) Park CH, Maack T. Albumin absorption and catabolism by isolated perfused convoluted tubules ofthe rabbit. J Clin Invest 1984; 73: 767-77

41) Gosling P, Beevers DG. Urinary albumin excretion in the general population. Clin Sci 1989; 76: 39-42.

42) Stehouwer CD, Lambert J, Donker AJ, van Hinsbergh VW. Endothelial dysfunction and pathogenesis of diabetic angiopathy. Cardiovasc Res 1997; 34: 55-68.

43) Gosling P. Microalbuminuria: a marker of systemic disease. Br J Hosp Med 1995; 54: 285-90.

44) Jensen JS. Renal and systemic transvascular albumin leakage in severe atherosclerosis. Arterioscler Thromb Vasc Biol 1995; 15: 1324-29.

45) Hickey NC, Shearman CP, Gosling P, Simms MH. Assessment of intermittent claudication by quantitation of exercise-induced microalbuminuria.Eur J Vasc Surg 1990; 4: 603-606.

46) Gosling P, Hughes EA, Reynolds TM, Fox JP. Microalbuminuria is an early response following acute myocardial infarction. Eur Heart J 1991; 12: 508-13.

47) Deckert T, Feldt-Rasmussen B, Borch-Johnsen K, Jensen T, Kofoed-Enevoldsen A: Albuminuria reflects widespread vascular damage. The Steno hypothesis. Diabetologia 32: 219–226, 1989

48) Jager A, van H, V, Kostense PJ, Emeis JJ, Nijpels G, Dekker JM, Heine RJ, Bouter LM, Stehouwer CD: C-reactive protein and soluble vascular cell adhesion molecule-1 are associated with elevated urinary albumin excretion but do not explain its link with cardiovascular risk. Arterioscler Thromb Vasc Biol 22: 593– 598, 2002

49) Stehouwer CD, Gall MA, Twisk JW, Knudsen E, Emeis JJ,Parving HH: Increased urinary albumin excretion, endothelial dysfunction, and chronic low-grade inflammation in type 2 diabetes: Progressive, interrelated, and independently associated with risk of death. Diabetes 51: 1157–1165,2002

50) Schram MT, Chaturvedi N, Schalkwijk CG, Fuller JH,Stehouwer CD:

Markers of inflammation are cross sectionally associated with microvascular complications and cardiovascular disease in type 1 diabetes: The EURODIAB Prospective Complications Study. Diabetologia 48: 370–378,2005

51) Nosadini R, Velussi M, Brocco E, Abaterusso C, Piarulli F, Morgia G, Satta A, Faedda R, Abhyankar A, Luthman H,Tonolo G: Altered transcapillary escape of albumin and microalbuminuria reflects two different pathogenetic mechanisms. Diabetes 54: 228 -233, 2005 Churchill Livingstone, 1982: 8-9

52) de Zeeuw D, Parving HH, Henning RH: Microalbuminuria as an early marker for cardiovascular disease. J Am SocNephrol 17: 2100–2105, 2006

53) Haraldsson B, Sorensson J: Why do we not all have proteinuria? An update of our current understanding of the glomerular barrier. News Physiol Sci 19: 7–10, 2004

54) Deen WM: What determines glomerular permeability? J Clin Invest 114: 1412–1414, 2004

55) Comper WD, Jerums G, Osicka TM: Differences in urinary albumin detected by four immunoassays and high-performance liquid chromatography. Clin Biochem 37: 105–111, 2004.

56) Brinkman JW, Bakker SJL, Gansevoort RT, Hillege HL,Kema IP, Gans RO, de Jong PE, de Zeeuw D: Which method for quantifying urinary albumin excretion gives what outcome? A comparison of immunonephelometry. WithHPLC. Kidney Int Suppl 92: S69–S75, 2004.

57) Brinkman JW, Bakker SJL, Gansevoort RT de Jong PE, de Zeeuw D: Falsely low urinary albumin concentrations after prolonged frozen storage of urine samples. Clin Chem 51: 2181 -2183, 2005

58) Abid O, Sun Q, Sugimoto K, Mercan D, Vincent JL. Predictive value of

microalbuminuria in medical ICU patients: results of a pilot study. Chest 2001; 120(6):1984–8.

59) Thorevska N, Sabahi R, Upadya A, Manthous C, Amoateng- Adjepong Y. Microalbuminuria in critically ill medical patients: prevalence, predictors, and prognostic significance. Crit Care Med 2003;31(4):1075–81.

60) Basu S, Bhattacharya M, Chatterjee TK, Chaudhuri S, Todi S, Majumdar A. Microalbuminuria: A novel biomarker of sepsis. Indian J Crit Care Med 2010;14:22-8

61) Gosling P, Brudney S, McGrath L, Riseboro S, Manji M. Mortality prediction at admission to intensive care: a comparison of microalbuminuria with acute physiology scores after 24 h. Crit Care Med 2003;31(1):98–103.

62) Honarmand Azim. The association of microalbuminuria and duration of mechanical ventilation in critically ill trauma patients *Turkish Journal ofTrauma & Emergency Surgery* 2009;15(1):12-18.

63) De Gaudio AR, Piazza E, Barneschi MG, Ginanni R, Martinelli P, Novelli GP. Peri-operative assessment of glomerular permeability. Anaesthesia 1995; 50(9): 810–2.

64) De Gaudio AR, Adembri C, Grechi S, Novelli GP. Microalbuminuria as an early index of impairment of glomerular permeability in postoperative septic patients. Intensive Care Med 2000;26(9):1364–8.

65) Sarti A, De Gaudio AR, Messineo A, Cuttini M, Ventura A. Glomerular permeability after surgical trauma in children: relationship between microalbuminuria and surgical stress score. Crit Care Med 2001; 29(8):1626–9.

66) Koike K, Aiboshi J, Shinozawa Y, Sekine K, Endo T, Yamamoto Y.

Correlation of glomerular permeability, endothelial injury, and postoperative multiple organ dysfunction. Surg Today 2004; 34(10):811–6.

67) Szakmany T, Molnar Z. Increased glomerular permeability and pulmonary dysfunction following major surgery: correlation of microalbuminuria and PaO/FiO ratio. Acta Anaesthesiol Scand 2004; 48(6):704–10.

68) Rinaldi S, Adembri C, Grechi S, De Gaudio AR. Low-dose hydrocortisone during severe sepsis: effects on microalbuminuria. Crit Care Med 2006 34(9): 2334–9.

69) Pallister I, Dent C, Wise CC, Alpar EK, Gosling P. Early posttraumatic acute respiratory distress syndrome and albumin excretion rate: a prospective evaluation of a 'point-of care' predictive test. Injury 2001;32(3):177–81

70) De Gaudio AR, Spina R, Di Filippo A, Feri M. Glomerular permeability and trauma: a correlation between microalbuminuria and Injury Severity Score. Crit Care Med 1999; 27(10):2105–8.

71) Nakamura T, Ushiyama C, Suzuki Y, Shoji H, Shimada N, Koide H. Hemoperfusion with polymyxin B immobilized fibers for urinary albumin excretion in septic patients with trauma. ASAIO J 2002;48(3):244–8.

72) Ando Y, Terao Y, Yamashita K, Fujinaga A, Tanabe T, Fukusaki M. The clinical course of microalbumiuria in 4 burn patients. Masui 2006; 55(7):897–9 [in Japanese].

73) Berton G, Citro T, Palmieri R, Petucco S, De Toni R, Palatini P. Albumin excretion rate increases during acute myocardial infarction and strongly predicts early mortality. Circulation 1997; 96(10):3338–45.

74) Yorgancioglu C, Tokmakoglu H, Suzer K, Zorlutuna Y. Does microalbuminuria in diabetic patients affect the postoperative course after

coronary artery bypass surgery? Eur J Cardiothorac Surg 2002; 21(3):395–400.

75) Koulouris S, Lekatsas I, Karabinos I, Ioannidis G, Katostaras T, Kranidis A, et al. Microalbuminuria: a strong predictor of 3-year adverse prognosis in nondiabetic patients with acute myocardial infarction. Am Heart J 2005; 149(5):840–5.

76) Gosling P, Czyz J, Nightingale P, Manji M. Microalbuminuria in the intensive care unit: Clinical correlates and association with outcomes in 431 patients. Crit Care Med 2006; 34(8):2158–66.

77) Fleck A, Raines G, Hawker F, et al (1985) Increased vascular permeability: a major cause of hypoalbuminemia in disease and injury. Lancet I:781–784

78) Baue AE, Durham R, Faist E. SIRS, MODS, MOF : are we winning the battle? Shock 1998;10:79-89.

79) R Martygona, M fried et al "APACHE II score may predict mortality in burns patients.crit care 2009 13(supp.1):p504

80) Acharya sp, pradhan b, marhatta mn. Application of "the sequential assessment of organ faiulure sofa score" in predicting outcome in icu patients with systemic inflammatory rseponse syndrome sirs kathmandu univ medj(kumj).2007 oct-dec5(4)475-83.

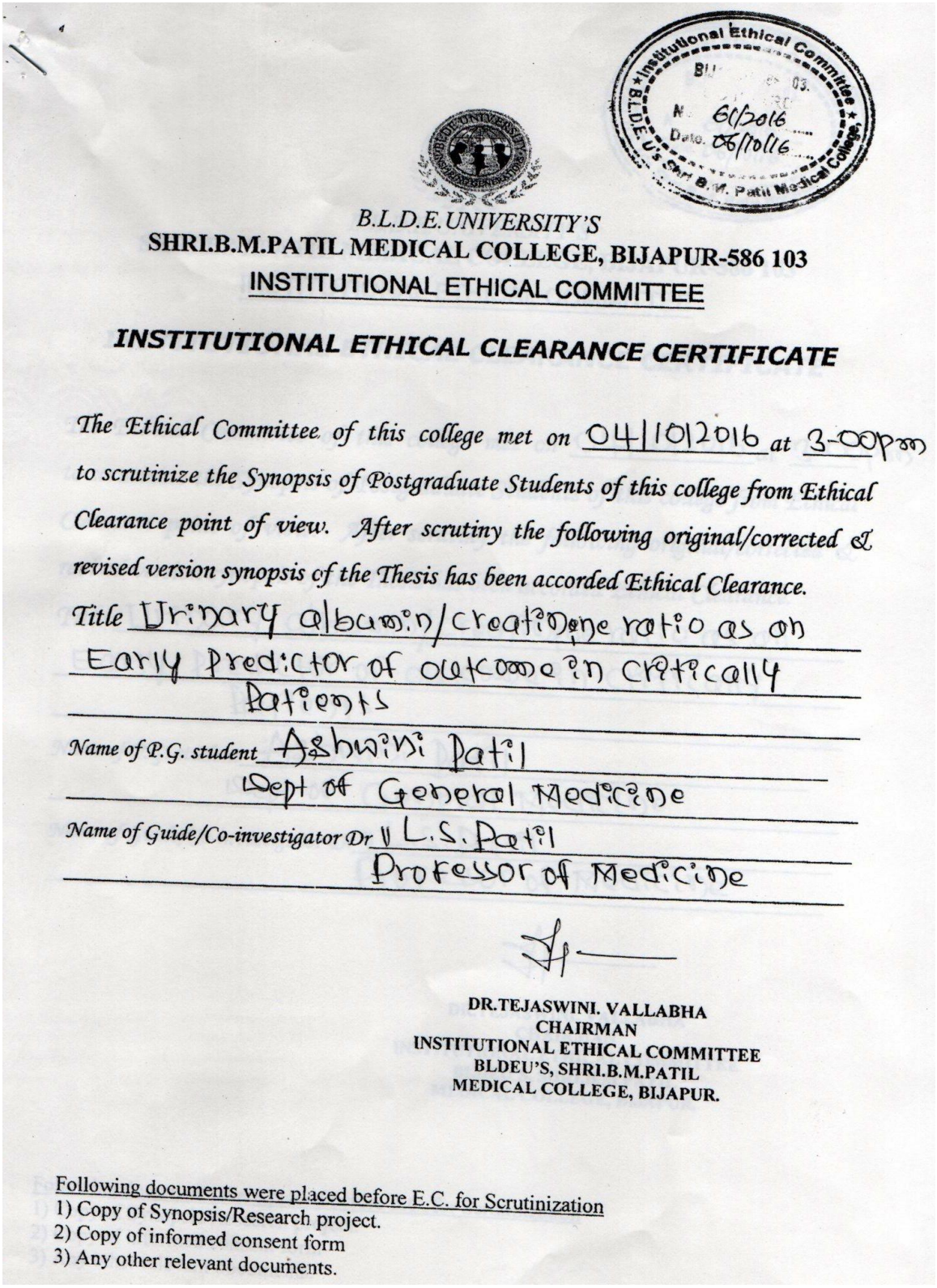
81) Molnar Z, Szakmany T, Koszegi T. Prophylactic N-acetylcysteine decreases serum CRP but not PCT levels and microalbuminuria following major abdominal surgery. A prospective, randomised, double-blinded, placebo-controlled clinical trial. Intensive Care Med 2003; 29(5):749–55.

82) Gopal S, Carr B, Nelson P. Does microalbuminuria predict illness severity in critically ill patients on the intensive care unit? A systematic review. Crit Care Med 2006; 34(6):1805–10.

ANNEXURES

ANNEXURE I

ETHICAL CLEARANCE CERTIFICATE



Institutional Ethical Committee
B.L.D.E.U's Shri B.M. Patil Medical College
No. 61/2016
Date. 06/10/16

B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 04/10/2016 *at* 3-00pm *to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.*

Title Urinary albumin/creatinine ratio as an Early Predictor of outcome in critically Patients

Name of P.G. student Ashwini Patil
Dept of General Medicine

Name of Guide/Co-investigator Dr Dr L.S. Patil
Professor of Medicine

DR.TEJASWINI. VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization
1) Copy of Synopsis/Research project.
2) Copy of informed consent form
3) Any other relevant documents.

ANNEXURE II

CONSENT FORM

INFORMED CONSENT FORM : **"**URINARY ALBUMIN/CREATININE RATIO AS AN EARLY PREDICTOR OF OUTCOME IN CRITICALLY ILL PATIENTS"

GUIDE : DR L.S.PATIL

P.G.STUDENT : DR ASHWINI PATIL

PURPOSE OF RESEARCH:

1. I have been informed that the purpose of this study is to evaluate microalbumin to creatinine ratio within 6 hours ICU admission and after 24 hours of ICU admission.

PROCEDURE:

I understand that I will undergo detailed history and clinical examination and investigations.

RISKS AND DISCOMFORTS:

I understand that there is no risk involved in this study and I may experience mild pain during the above mentioned procedures.

BENEFITS:

I understand that my participation in this study will help to correlate urinary albumin/ creatinine ratio as an early predictor of outcome in critically ill patients in this part of state.

CONFIDENTIALITY:

I understand that the medical information produced by the study will become a part of hospital record and will be subjected to confidentiality and privacy regulation of hospital. If the data is used for publication the identity will not be revealed.

REQUEST FOR MORE INFORMATION :

I understand that I may ask for more information about the study at any time.

REFUSAL OR WITHDRAWAL OF PARTICIPATION :

I understand that my participation is voluntary and I may refuse to participate or withdraw from study at any time.

INJURY STATEMENT :

I understand in the unlikely event of injury to me during the study I will get medical treatment but no further medical compensation.

(Signature of Guardian) (Signature of patient)

STUDY SUBJECT CONSENT FORM:

I confirm that Dr.ASHWINI PATIL has explained to me the purpose of this research, the study procedure that I will undergo and the possible discomforts and benefits that I may experience, in my own language.

I have been explained all above in detail in my own language and I understand the same. I agree to give my consent to participate as a subject in this research project.

SIGNATURE OF PARTICIPANT DATE

SIGNATURE OF WITNESS DATE

ANNEXURE III

SCHEME OF CASE TAKING

Name: CASE NO:

Age: OP/IP NO:

Sex: DOA:

Religion: DOD:

Occupation:

Address:

Presenting complaints with duration:

History of presenting complaints:

Past History:

Family History:

Personal History:

Diet

Appetite

Sleep

Bladder and bowel habits:

Others

Treatment History:

General Physical Examination

Pallor: present/absent

Icterus: present/absent

Cyanosis: present/absent

Clubbing: present/absent

Generalized lymphadenopathy: present/absent

Odema: present/absent

Built:

Nourishment:

Vitals

PR:

BP: in mm of mercury (mm hg)

RR:

Temp:

SYSTEMIC EXAMINATION.

- Central nervous system

Respiratory Examination :

Cardiovascular System :

Per Abdomen :

Investigations :

At 6 hrs **At 24 hrs**

Urine Micro Albumin : Urine Micro Albumin :

Urine Creatinine : Urine Creatinine :

Routine blood examination :

Hb :

Tc :

DLC :

ESR :

Platelet Count :

Urine Examination :

S. electrolytes Na^+ -

K^+ -

Ca^{++} -

Bleeding Time :

Clotting Time :

Prothrombin Time :

Renal Function tests : S. Creatinine :

Blood urea :

Liver function tests :

S. Bilirubin (total) :

Uncongugated S. Bilurubin :

Congugated S. Bilurubin :

Serum Protein :

Serum Albumin :

A/G Ratio :

SGOT :

SGPT :

Alkalinephosphatase :

Arterial blood gas analysis :

PH :

PCO_2 :

HCO_3 :

Fio_2 :

Chest X-ray :

ECG :

CT Scan :

Calculation of Apache II, SOFA Score :

MASTER CHART

Sl. No	IP NO	D.O.A	NAME	AGE	SEX	DURATION OF STAY	PRESENTING SYMPTOMS									GCS SCORE		APACHE II SCORE		SOFA SCORE		URINARY MICROALBUMIN		URINARY CREATININE AT 6 AND 24 HOURS		ALBUMIN CREATININE RATIO		CXR	ECG	2D ECHO	CT	DIAGNOSIS	D.O.D	CLINICAL OUTCOME
							CHEST PAIN	ALTERED SENSOR	DYSPENIA	COUGH	SEIZURE	LOC	FEVER	COSUMPTION OF POISON	HEMIPARESIS	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs							
1	37792	5.11.16	SANGANGOUDA	84	M	13	-	-	+	+	-	-	-	-	-	8	8	32	33	10	10	70	74	62	60	25	31	LEFT SIDED PLUERAL EFFUSIO	WNL	-	-	CVA	18.11.16	IMPROVED
2	34835	19.10.16	SHRISHIL	65	M	3	-	-	-	-	-	-	+	-	+	3	3	12	14	9	10	60	68	67	68	34	36	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	22.10.16	DIED
3	35956	29.10.16	ANASUYA	28	F	3	-	-	-	-	+	-	-	-	-	3	4	17	18	10	11	85	80	55	60	40	44	WNL	WNL	-	GLIOSIS	SEIZURE DISORDER	31.10.18	DIED
4	36442	2.11.16	CHANNAMMA	75	F	5	-	-	-	+	-	-	+	-	-	10	10	28	24	10	11	64	68	70	74	24	26	UPPER LOBE PNEMONIA	WNL	-	-	LRTI	6.11.18	IMPROVED
5	36934	6.11.16	NINGAPPA	28	M	6	-	-	-	-	-	-	+	+	-	3	4	12	14	8	8	100	139	120	140	36	46	WNL	WNL	-	-	OP POISON	11.11.17	DIED
6	35847	28.10.16	PANDU	62	M	9	+	_	_	-	-	-	-	-	-	13	12	21	22	16	16	80	90	230	260	34	35	WNL	ST ELEVATION INFERIOR WALL	IHD EF 35	-	MI	4.11.16	IMPROVED
7	39809	1.12.16	SIDDAPPA	65	M	10	-	-	+	+	-	-	+	-	-	10	10	15	16	4	4	84	78	120	138	50	56	COPD CHANGES	WNL	-	-	COPD	10.12.16	DIED
8	39920	2.12.16	NINGAMMA	24	F	29	-	-	-	-	-	-	-	-	-	7	6	12	13	5	6	60	70	50	60	56	56	ASPIRATION PNEUMONIA	WNL	-	-	OP POISON	29.12.16	DIED
9	41370	15.12.16	MALLAMMA	28	F	6	-	-	-	-	+	-	-	-	-	3	3	15	16	5	6	150	200	76	120	30	24	WNL	WNL	-	-	SEIZURE DISORDER	21.12.16	IMPROVED
10	41989	21.12.16	SHIVARAJ	35	M	7	-	-	-	-	-	-	-	+	-	3	3	16	17	8	7	60	78	78	66	44	46	WNL	WNL	-	-	OP POISON	27.12.16	IMPROVED
11	1440	5.1.17	MAHADEVI	65	F	12	-	-	+	+	-	-	-	-	-	3	3	19	20	11	12	90	111	80	90	28	31	COPD CHANGES	WNL	-	-	COPD	17.1.17	IMPROVED
12	35847	28.10.16	PANDU	62	M	5	-	-	+	-	-	-	-	-	-	10	10	18	20	9	10	104	130	40	50	34	38	WNL	WNL	-	-	COPD	10.1.17	DIED
13	4320	11.1.17	KALLAPPA	55	M	6	-	-	-	-	-	+	-	-	-	4	4	12	13	4	4	98	104	64	68	46	50	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	16.1.17	DIED
14	3620	15.1.17	SHEELA	26	F	6	-	-	-	-	-	+	-	-	-	3	3	14	15	12	12	64	68	80	84	28	30	WNL	WNL	-	-	OP POISON	21.1.17	IMPROVED
15	4812	6.2.17	MALLAPPA	60	M	10	-	-	-	-	-	+	-	-	-	3	3	18	20	7	8	120	124	74	70	44	54	WNL	WNL	-	-	CVA	16.2.17	DIED
16	9881	5.3.17	HAZISAB	55	M	10	-	-	+	+	-	-	-	-	-	10	10	21	22	7	7	100	110	60	64	26	32	WNL	WNL	-	-	COPD	15.3.17	IMPROVED
17	9681	7.3.17	RENUKA	24	F	5	-	-	-	-	-	+	-	-	-	3	3	13	15	9	10	78	80	50	54	31	32	WNL	WNL	-	-	OP POISON	12.3.17	IMPROVED
18	9884	10.3.17	REVANSIDDAPPA	60	M	4	-	-	-	-	-	+	-	-	-	3	3	11	12	7	7	130	120	86	90	60	64	WNL	WNL	-	IC BLEED	CVA	14.3.17	DIED
19	9781	12.3.17	DEVAMMA	55	F	6	-	-	+	-	-	-	-	-	-	8	8	15	16	9	9	110	112	76	78	40	43	COPD CHANGES	WNL	-	-	COPD	18.3.17	IMPROVED
20	15899	19.5.17	BHIMRAY	35	M	11	-	-	-	-	-	-	-	+	-	3	3	4	4	6	6	90	98	76	100	30	32	WNL	WNL	-	-	OP POISON	30.5.17	IMPROVED
21	17335	30.5.17	BABU	45	M	8	-	+	-	-	-	-	-	-	-	10	10	12	13	7	7	80	94	76	84	56	58	WNL	WNL	-	-	CLD	7.5.17	DIED
22	17107	30.5.17	PARVATI	34	F	7	-	+	-	-	-	-	-	-	-	3	3	8	10	7	7	78	108	90	94	26	28	WNL	ST DEPRESSION	IHD EF 35	-	MI	6.6.17	IMPROVED
23	21855	27.6.17	SWAPNA	25	F	4	-	-	-	-	-	-	-	+	-	4	4	11	11	3	4	100	104	50	60	24	28	WNL	WNL	-	-	OP POISON	31.6.17	IMPROVED

Sl. No	IP NO	D.O.A	NAME	AGE	SEX	DURATION OF STAY	PRESENTING SYMPTOMS									GCS SCORE		APACHE II SCORE		SOFA SCORE		URINARY MICROALBUMIN		URINARY CREATININE AT 6 AND 24 HOURS		ALBUMIN CREATININE RATIO		CXR	ECG	2D ECHO	CT	DIAGNOSIS	D.O.D	CLINICAL OUTCOME
							CHEST PAIN	ALTERED SENSOR	DYSPENIA	COUGH	SEIZURE	LOC	FEVER	COSUMPTION OF POISON	HEMIPARESIS	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs							
24	17764	2.6.17	REVANSIDDAPPA	42	M	3	-	-	+	+	-	-	-	-	-	8	8	18	16	5	5	108	112	90	98	44	48	EXTENSIVE PULMONARY TB	WNL	-	-	LRTI	7.6.17	DIED
25	21582	29.6.17	SUMITRA	75	F	8	-	+	+	-	-	-	-	-	-	6	6	24	24	8	8	60	86	40	50	50	56	COPD CHANGES	WNL	-	-	COPD	7.6.17	DIED
26	14281	8.4.17	SHRISHAIL	65	M	28	-	-	-	-	-	+	-	-	-	3	3	13	13	8	9	90	94	74	78	34	36	WNL	WNL	-		CVA	5.5.17	IMPROVED
27	14283	30.4.17	BANGARAVVA	60	F	5	-	+	-	-	-	-	+	-	-	6	7	16	17	12	13	72	78	60	64	70	78	RIGHT SIDED COSOLIDATION	WNL	-		SEPSIS	4.5.17	DIED
28	12920	22.4.17	MALLAPPA	33	M	18	-	-	-	+	-	-	-	-	-	6	8	12	14	7	8	100	104	70	78	34	35	WNL	WNL	-		CLD HE	10.5.17	IMPROVED
29	12590	8.4.17	MANJUNATH	30	M	6	-	-	-	-	-	-	-	-	-	14	15	9	9	2	2	78	102	64	70	40	45	B/L LOWER LOBE CONSOLIDATION	WNL	-		KEROSINE POISON WITH SEPSIS	14.4.17	DIED
30	20730	26.6.17	DHAREPPA	89	M	11	-	-	+	-	-	-	+	-	-	8	8	24	25	11	11	104	116	60	80	47	56	RIGHT SIDE MODERATE PLEURAL EFFUSION	P PULMONALE	-		COPD WITH SEPTICEMIA	07.07.17	DIED
31	20909	27.6.17	SWAPNA	18	F	9	-	-	-	-	-	-	-	+	-	5	5	8	7	8	8	80	90	50	60	34	32	WNL	WNL	-		OP POISON	6.7.17	IMPROVED
32	20844	27.6.17	SIDDAPPA	76	M	6	+	-	+	-	-	-	-	-	-	12	13	32	33	8	9	84	90	70	70	40	46	WNL	ST ELEVATION INFERIOR WALL MI	EF-35 IHD		MI	3.7.17	DIED
33	22862	7.7.17	BHIMRAY	46	M	8	+	-	-	-	-	-	-	-	-	12	12	19	20	11	10	126	120	64	60	56	58	WNL	ST ELEVATION MI	IHD EF-50		MI	12.7.17	DIED
34	20691	25.6.17	TAVARU	60	M	5	-	-	-	-	-	-	-	+	-	5	6	17	18	3	4	116	120	90	90	60	64	WNL	WNL	-		OP POISON	30.6.17	IMPROVED
35	28376	25.8.17	SANGANGOUDA	50	M	14	-	-	-	-	-	-	-	-	-	7	6	16	17	8	8	50	80	34	34	50	56	WNL	ST DEPRESION IN II III AVF	IHD EF 50	-	MI	7.9.17	IMPROVED
36	9420	17.3.17	MAHADEV	70	M	5	-	+	_	-	-	-	-	-	-	8	8	14	15	7	8	36	36	46	50	68	72	WNL	WNL	-	-	COPD	21.3.17	DIED
37	10750	28.3.18	YASHAVANT	62	M	10	-	+	+	-	-	-	-	-	-	8	9	12	12	6	6	32	50	13	36	60	68	PLEURAL EFUSION	WNL	-	-	LRTI	8.4.18	IMPROVED
38	11901	4.3.18	SHIVANGOUDA	60	M	8	-	-	-	-	-	-	-	-	-	9	9	13	16	6	6	64	68	66	65	70	71	WNL	ST ELEVATION II III AVF	EF-35 IHD	-	MI	11.4.18	IMPROVED
39	650	5.1.18	SHIVAPPA	76	M	6	-	-	-	-	-	-	-	-	-	12	12	27	26	8	7	439	330	60	70	74	78	WNL	Q WAVES IN II III AVF	IHD	-	MI	10.1.18	DIED
40	758	6.1.18	CHAWADDPPA	76	M	9	-	+	+	-	-	-	-	-	-	12	12	30	30	8	8	50	40	50	70	31	33	COPD CHANGES	WNL	WNL	-	COPD	14.1.18	IMPROVED
41	775	6.1.18	MALLAPPA	60	M	5	-	+	+	-	-	-	-	-	-	8	7	26	24	5	6	120	128	40	44	68	70	COPD CHANGES	WNL	WNL	-	COPD	10.1.18	DIED
42	1627	13.1.18	NARASAPPA	65	M	7	-	-	-	-	-	-	-	-	-	10	10	21	22	6	6	23	20	215	173	34	38	CARDIOMEGALY	ST DEPRESSION V1,V6	IHD EF 35	-	MI	19.1.18	IMPROVED
43	2071	17.1.18	GORAKANATH	68	M	3	-	-	-	-	-	-	-	-	-	10	8	20	21	6	7	530	500	42	44	38	44	WNL	PATHOLOGICAL Q WAVES PRESENT	IHD	-	MI	19.1.18	DIED
44	2436	19.1.18	PARSHURAM	50	M	12	+	-	-	-	-	-	-	-	-	6	5	14	15	4	6	40	83	192	114	46	50	WNL	WNL	-	TBM	TBM	30.1.18	DIED
45	4156	2.2.18	ASHOK	47	M	8	+	_	-	-	-	-	-	-	-	13	14	26	24	6	7	50	55	110	116	36	40	UPPER LOBE FIBROSIS	WNL	-	-	TBM	9.2.18	IMPROVED
46	4176	3.2.18	LAKAPPA	70	M	3	+	-	-	-	-	-	-	-	-	6	7	19	20	8	8	34	38	63	60	80	84	WNL	WNL	-	ACUTE INFACT	CVA	5.2.18	DIED
47	4242	3.2.18	KANTABAI	45	F	1	-	-	+	-	-	-	+	-	-	10	11	25	26	6	7	134	130	34	40	34	40	LOWER LOBE PNEUMONIA	WNL	-	-	LRTI	3.2.18	IMPROVED
48	4843	8.2.18	ANAND	43	M	8	+	-	-	-	-	-	-	-	-	10	11	21	22	10	11	30	60	275	200	75	79	WNL	WNL	-	-	CLD	15.2.18	DIED

Sl. No	IP NO	D.O.A	NAME	AGE	SEX	DURATION OF STAY	PRESENTING SYMPTOMS									GCS SCORE		APACHE II SCORE		SOFA SCORE		URINARY MICROALBUMIN		URINARY CREATININE AT 6 AND 24 HOURS		ALBUMIN CREATININE RATIO		CXR	ECG	2D ECHO	CT	DIAGNOSIS	D.O.D	CLINICAL OUTCOME
							CHEST PAIN	ALTERED SENSOR	DYSPENIA	COUGH	SEIZURE	LOC	FEVER	COSUMPTION OF POISON	HEMIPARESIS	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs							
49	3261	2.2.18	SHIVARAJ	26	M	5	-	-	-	-	-	-	-	-	+	3	3	17	16	14	12	100	102	36	332	40	44	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	5.2.18	IMPROVED
50	4110	2.2.18	LAXMIBAI	60	F	8	+	-	-	-	-	-	-	-	-	14	14	29	28	8	8	40	44	80	83	38	42	WNL	ST ELEVATION IN INFERIOR WALL	IHD EF 45	-	MI	9.2.18	IMPROVED
51	4303	4.2.18	MALAPPA	73	M	4	-	-	+	+	-	-	-	-	-	8	9	24	25	8	8	29	30	50	40	58	76	PNEMONIA	WNL	-	-	PNEUMONIA WITH SEPSIS	7.2.18	DIED
52	4355	5.2.18	KALLAYA	75	M	4	+	-	-	-	-	-	-	-	-	10	10	23	24	10	10	400	493	150	160	26	31	WNL	ST DEPRESSION IN II III AVF	IHD	-	MI	8.2.18	IMPROVED
53	4434	5.2.18	SANTHOSH	22	M	6	-	-	+	+	_	-	+	-	-	14	13	24	25	8	8	30	44	43	46	69	95	PNEMONIA	WNL	-	-	LRTI SEPSIS	10.2.18	DIED
54	4847	8.2.18	BHEEMSING	52	M	18	-	+	-	-	-	-	+	-	+	14	12	12	11	4	5	400	417	44	46	90	88	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	26.2.18	DIED
55	5025	9.2.18	JAVEED	25	M	21	-	+	+	+	_	-	-	-	-	8	10	22	23	6	7	30	34	208	200	45	46	SUGGESTIVE OF PTB	WNL	-	-	TBM	2.3.18	IMPROVED
56	4843	8.2.18	ANAND	43	M	7	-	+	-	-	-	-	-	-	-	8	7	18	17	8	9	34	40	275	270	68	73	WNL	WNL	-	-	CLD HE	14.2.18	DIED
57	5950	17.2.18	SHEENABAI	26	F	6	-	+	-	-	-	-	+	-	-	10	10	19	20	7	8	30	64	42	44	71	76	WNL	WNL	-	-	CLD HE	17.2.18	IMPROVED
58	6753	23.2.18	NEELAMMA	72	F	6	-	-	+	+	-	-	+	-	-	13	13	28	30	12	13	38	44	188	160	34	40	COPD CHANGES	WNL	-	-	COPD	28.2.18	IMPROVED
59	6746	23.2.18	SHIVANNA	57	M	5	+	-	+	+	-	-	+	-	-	13	12	36	34	9	10	46	48	97	108	44	47	PNEUMONIA	WNL	-	-	LRTI	27.2.18	IMPROVED
60	6957	25.2.18	YASHAVANT	62	M	16	+	-	+	+	-	_	+	-	-	14	13	26	28	6	8	44	60	101	104	43	57	PLUERAL EFFUSION	WNL	-	-	SEPSIS	10.3.18	DIED
61	6958	13.3.17	RAGAVENDRA	50	M	5	-	+	-	-	+	-	+	-	-	14	12	24	22	9	10	134	138	78	80	30	32	WNL	WNL	-	GLIOSIS	SEIZURE DISORDER	17.3.17	IMPROVED
62	20558	29.6.17	KAMALA	55	F	6	-	-	-	-	+	+	_	-	+	3	3	23	24	13	12	66	100	60	66	45	56	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	4.7.17	DIED
63	23270	15.7.17	SANGANGOUDA	50	M	13	-	+	-	-	+	+	-	-	-	8	8	18	17	7	8	44	48	26	28	69	71	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	27.7.17	IMPROVED
64	23981	21.7.17	NATHU	35	M	8	-	+	-	-	-	-	-	-	-	6	6	16	18	7	8	80	90	100	106	80	84	WNL	WNL	-	-	CLDE HE	28.7.17	DIED
65	23838	20.7.17	SIDAPPA	90	M	3	-	-	+	+	-	-	-	-	-	13	12	26	26	13	14	90	93	50	60	75	78	PNEMONIA	WNL	-	-	SEPSIS	22.7.17	DIED
66	24 000	21.7.17	MADIVALLAYYA	70	M	4	-	+	-	-	-	-	+	-	-	8	6	18	19	7	8	64	68	70	80	85	91	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	23.7.17	IMPROVED
67	24144	23.7.17	BHARATI	28	F	5	+	-	+	+	-	-	-	-	-	8	8	24	25	7	7	34	44	70	74	48	59	COSOLIDATION	WNL	-	-	SEPSIS	27.7.17	DIED
68	24182	23.7.17	NAGRAJ	28	M	6	-	+	-	-	+	-	-	-	-	6	5	15	16	8	7	40	47	36	40	28	67	WNL	WNL	-	-	SEIZURE DISORDER	28.7.17	IMPROVED
69	25918	6.8.17	NANDISH	45	M	10	-	-	+	+	-	-	+	-	-	7	7	19	20	9	8	35	32	44	90	79	78	FIBROSIS	WNL	-	-	LRTI	16.8.17	IMPROVED
70	26789	13.8.17	SHARAMMA	40	F	8	-	+	-	-	-	-	-	-	-	7	7	20	19	10	11	58	67	48	58	90	94	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	20.8.17	IMPROVED
71	27394	18.8.17	CHANDAPPA	60	M	10	-	+	+	-	-	-	-	-	-	10	9	39	36	12	11	90	93	50	30	98	100	FIBROSIS	WNL	_	-	SEPSIS	28.8.17	DIED
72	27391	18.817	SUBAS	50	M	5	-	-	-	-	-	-	+	-	-	6	7	24	25	12	13	40	50	70	64	57	78	WNL	WNL	-	-	CLD HE	22.8.17	IMPROVED
73	25573	3.8.17	BHIMAPPA	52	M	4	-	+	-	-	-	+	-	-	-	3	3	21	24	12	14	81	123	50	40	62	68	WNL	WNL	-	-	SEIZURE DISORDER	6.8.17	IMPROVED
74	25732	4.8.17	VENKANGOUDA	80	M	2	-	+	+	-	-	-	+	-	-	8	7	26	27	9	10	100	114	38	44	76	78	COPD CHANGES	WNL	-	-	COPD	5.8.17	DIED
75	25805	5.8.17	LAXMIBAI	30	F	6	-	-	-	-	-	+	_	-	-	5	6	12	13	8	8	60	64	40	50	55	58	WNL	WNL	-	TBM	TBM	10.8.17	DIED

Sl. No	IP NO	D.O.A	NAME	AGE	SEX	DURATION OF STAY	PRESENTING SYMPTOMS									GCS SCORE		APACHE II SCORE		SOFA SCORE		URINARY MICROALBUMIN		URINARY CREATININE AT 6 AND 24 HOURS		ALBUMIN CREATININE RATIO		CXR	ECG	2D ECHO	CT	DIAGNOSIS	D.O.D	CLINICAL OUTCOME
							CHEST PAIN	ALTERED SENSOR	DYSPENIA	COUGH	SEIZURE	LOC	FEVER	COSUMPTION OF POISON	HEMIPARESIS	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs	6 Hrs	24 Hrs							
76	25917	6.8.17	TARABAI	60	F	4	-	-	-	+	+	+	-	-	-	4	4	16	17	9	9	60	80	40	44	45	46	WNL	WNL	-	-	CVA	9.8.18	IMPROVED
77	26790	13.8.17	ABDULREHMAN	80	M	6	+	-	+	+	-	-	-	-	-	8	9	20	24	10	11	97	116	36	38	56	58	CONSOLIDATION	WNL	-	-	SEPSIS	16.8.17	DIED
78	26800	14.8.17	SHIVANAND	70	M	3	-	-	-	-	+	-	-	-	-	6	7	15	16	12	13	53	73	50	66	60	64	WNL	WNL	-	-	SEIZURE DISORDER	16.8.18	IMPROVED
79	27516	19.8.17	NEELAKANTAYYA	78	M	5	-	+	-	-	-	-	-	-	+	14	12	32	31	13	13	48	58	30	40	66	70	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	23.8.17	DIED
80	27518	19.8.17	SANGMESH	18	M	5	-	-	+	+	-	-	-	-	-	10	11	25	26	9	10	68	70	85	86	80	81	PNEMONIA	WNL	-	-	LRTI	23.8.17	IMPROVED
81	28370	25.8.17	MAREPPA	40	M	5	-	+	-	-	-	+	+	-	-	8	8	22	24	8	9	90	100	135	111	66	90	WNL	WNL	-	WNL	CEREBREL MALARIA	29.8.17	DIED
82	12174	9.4.18	SHENKAREPPA	70	M	12	-	+	-	-	-	-	-	-	-	6	6	15	15	8	8	48	50	93	96	51	52	WNL	WNL	-	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	20.4.18	IMPROVED
83	12732	13.4.18	SHARALA	50	F	8	+	-	+	-	-	-	-	-	-	10	10	11	12	9	9	40	50	36	38	34	36	WNL	ST DEPRESSION	IHD EF 50	-	MI	20.4.18	IMPROVED
84	11816	6.4.18	RATNAPPA	64	M	3	+	-	-	-	-	-	-	-	-	12	12	13	14	6	6	30	60	52	54	57	58	WNL	ST DEPRESSION	IHD EF 40	-	MI	8.4.18	IMPROVED
85	11202	1.4.18	DYAMAWWA	65	F	2	-	-	-	-	-	-	-	-	+	9	8	15	15	8	8	43	60	30	40	65	66	WNL	WNL	WNL	ACUTE INFARCT IN RIGHT PARIETO REGION	CVA	2.4.18	DIED
86	12461	11.4.18	SIDDAPPA	50	M	4	+	-	-	-	-	-	-	-	-	10	10	16	17	6	7	357	358	80	84	44	46	WNL	ST ELEVATION V1 TO V4	IHD EF 45	-	MI	14.4.18	IMPROVED
87	12174	10.4.18	SHENKERAPPA	5	M	2	-	+	+	-	-	-	-	-	-	7	7	15	16	9	9	73	74	90	93	80	84	COPD CHANGES	WNL	WNL	-	COPD	12.4.18	DIED
88	12461	11.4.18	SIDDAPPA	60	M	5	-	+	+	-	-	-	-	-	-	8	6	18	19	7	8	300	350	80	84	38	46	COPD CHANGES	WNL	WNL	-	COPD	14.4.18	DIED
89	12732	16.4.18	SHARADA	50	F	5	-	+	-	-	+	-	-	-	-	5	5	16	16	9	9	100	104	70	74	42	43	WNL	WNL	WNL	GLIOSIS	SEIZURE DISORDER	20.4.18	IMPROVED
90	13144	17.4.18	BASAVARAJ	77	M	11	+	-	-	-	-	-	-	-	-	10	10	12	13	9	9	44	50	200	208	56	65	WNL	T WAVE INVERSION	IHD EF 45	-	MI	27.4.18	DIED
91	13144	17.4.18	BASAVARAJ	77	M	9	+	-	-	-	-	-	-	-	+	5	6	18	19	10	11	98	100	86	90	112	114	WNL	WNL	-	-	CVA	25.4.18	IMPROVED
92	14354	28.4.18	SIDAWWA	70	F	3	-	-	-	-	-	-	-	-	-	9	9	12	12	6	6	50	54	48	50	79	80	WNL	ST DEPRESSION	IHD EF 50	-	MI	30.4.18	IMPROVED
93	15971	11.5.18	DAWALBI	68	F	4	-	+	+	-	-	-	-	-	-	10	11	14	14	8	8	45	52	96	98	56	58	PLEURAL EFUSION	WNL	WNL	-	SEPSIS	14.5.18	DIED
94	17659	25.5.18	RAYAWWA	72	F	1	+	-	-	-	-	-	-	-	-	12	12	16	16	10	11	60	64	90	98	66	67	WNL	ST ELEVATION MI	IHD EF 35	-	MI	25.5.18	DIED
95	17772	25.5.18	BALAWWA	25	F	6	-	+	+	-	-	-	-	+	-	4	4	18	16	14	13	600	300	78	90	76	78	WNL	WNL	WNL	-	OP POISON	30.5.18	DIED
96	18588	1.6.18	DEYAPPA	70	M	10	-	-	-	-	-	-	-	-	-	6	6	16	15	12	13	104	100	84	88	46	50	CONSOLIDATION	WNL	WNL	-	SEPSIS	10.6.18	DIED
97	18658	2.6.17	DONDIBA	65	M	2	-	+	-	-	-	-	-	-	-	5	5	16	17	9	9	284	290	66	68	43	44	WNL	WNL	WNL	TBM	TBM	4.6.18	IMPROVED
98	19557	9.6.18	BOURAMMA	50	F	10	-	+	-	-	-	-	-	+	-	6	6	14	16	8	10	40	60	78	80	51	75	WNL	WNL	WNL	-	OP POISON	19.6.18	IMPROVED