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# Thyroid Function Abnormalities with Different Stages of Chronic Kidney Disease: A Hospital Based Study

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## ABSTRACT

**Background:** Waste accumulates in the body because of abrupt kidney function or acute kidney injury (AKI) declines. Hospitalised and critically ill individuals are more vulnerable to its incidence and fatality rates, which vary worldwide. Infections, poisons, and fluid imbalances are among the causes. Rapid changes in the definition of AKI impact clinical care and epidemiological assessments. This hospital-based study aims to examine the presence of thyroid function abnormalities at different stages of chronic renal disease.

**Methods:** Patients have undergone a comprehensive evaluation that includes a history, a physical examination, and a variety of laboratory tests, including a complete blood count, tests to evaluate renal and liver function, and imaging scans. All the patients eligible for the study were included, and the study variables were measured with great care and cross-checked numerous times to reduce the likelihood of any information bias occurring.

**Results:** There was a significant male predominance, with 52 males (61.2% of the total) and 33 females (38.8%) affected by AKI. Those between the ages of 41 and 60 accounted for 52.9% of all cases. One of the most common symptoms was fever, hypotension, tiredness, and oliguria. Sepsis accounts for 38.8% of cases, whereas acute gastroenteritis accounts for 17.7%. Biochemical studies aided the diagnosis.

**Conclusion:** Hospitalised patients face many obstacles due to numerous factors associated with AKI. Prompt detection and early action are crucial to prevent irreversible harm, particularly in cases of septicemia.

**Key-words:** Acute kidney injury (AKI), Hospitalised patients, Laboratory tests, Fatality rates, Septicemia

## INTRODUCTION

Acute kidney injury, also known as acute renal failure, is characterised by an abrupt deterioration of renal function that causes waste products that the kidneys typically clear—like nitrogenous and other waste products—to be retained in the body [1]. AKI suggests that kidney damage occurs continuously and can take many forms, ranging from moderate to severe.

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Uncertainties in the epidemiology and clinical management of AKI have improved with the KDIGO criteria and classification based on objective measures like creatine levels and urine output.

AKI is defined as a 48-hour loss in kidney function as evidenced by a rise in serum creatinine of more than 0.3 mg/dl, an increase in serum creatinine of more than 50%, or the onset of oliguria, under a standard definition from the AKI Network established in 2007 [2].

This buildup is caused by metabolic abnormalities, such as metabolic acidosis and hyperkalemia, changes in bodily fluid balance, and impacts on many other organ systems, depending on the degree and duration of the renal failure. According to recent data, even minor modifications in renal function are linked to significant

 

increases in mortality [3]. Because of this, the term ARF was replaced with AKI, which covers the whole range of symptoms, from slight alterations in renal function indicators to the need for renal replacement therapy (RRT) [2].

Hospitalised patients, and especially those who are severely sick, frequently suffer from AKI. The incidence and fatality rates of AKI vary widely around the globe, ranging from 1-31% to 28-82% [4]. It is now a significant risk factor for death in intensive care units rather than an innocent bystander reflecting co-existing diseases. An estimated two million individuals worldwide pass away from AKI each year, and those, who survive the condition are more likely to develop chronic kidney disease (CKD) [5].

Because the definition of AKI is changing so quickly, there has been much discussion over the precise occurrence of AKI. Depending on the criteria, the incidence might range from 1% to 31% based on the literature that is currently accessible [6-8]. Eswarappa *et al*. [7]. did prospective observational research on 100 critically sick patients in the Indian community. They discovered that the incidence of AKI was 17.3 cases/1000 individuals. They also found that the death rates varied from 15% to 60% and that the frequency of AKI in ICU settings was >40% if sepsis was present. [7]

People with many co-morbidities and older people are shown to have an elevated risk of AKI. An Italian study discovered that hospitalised patients 65 years of age or older had a ten-fold greater incidence of AKI than younger patients.

The epidemiology of AKI in underdeveloped nations is distinct from that of industrialised nations in that some factors-like infections, obstetrical causes, and nephrotoxins-remain significant contributors to the disease. Up to 30% of hospitalisations to the critical care unit and 5–7% of hospital admissions for acute care are complicated by AKI [9] and is a significant medical issue in impoverished nations, especially when combined with infectious disorders like leptospirosis and malaria, snake bites, and natural calamities [10]. Numerous disorders might become more complicated by AKI. It is separated into three groups for diagnosis and treatment [11] intrinsic renal (caused by damage to the kidney itself), postrenal (induced by restriction to urine flow), and prerenal (caused by diminished renal perfusion, primarily due to volume depletion). It might be obtained through a hospital or the community. Although the leading causes of the former—diarrhea and vomiting, medications, and distal obstructions—also account for the latter, which is mainly caused by sepsis, operations, heart or liver failure, contrast administration, and medications. Envenomation, leptospirosis, and malaria are a few region-specific aetiologies observed in this portion of the nation. The causes vary significantly amongst countries.

## MATERIALS AND METHODS

**Study method**- The selected patients were subjected to thorough history taking, detailed physical examination, laboratory investigations like CBC, blood urea, Sr. creatinine, Sr. sodium, Sr. potassium, LFT, FPG, 2 hrs PPG, HbA1C, Sr. protein & Albumin, Lipid Profile, Urine routine microscopy and Ultrasound abdomen & pelvis for kidney, ureter and bladder. In selected cases, serological tests for leptospirosis, peripheral smear for Malaria parasites, ICT for Malaria, ANA, dsDNA, Hb% electrophoresis and other investigations required for the study were done. Selection Bias, the most common type of bias, was eliminated by including all patients who met the Inclusion and Exclusion criteria. To eliminate the possibility of information bias, the study meticulously measured and cross-checked all the crucial factors at least three times before categorising them.

**Inclusion Criteria**- Patients over 14 years old admitted to M.K.C.G. Medical College & Hospital, Berhampur, with an acute increase in serum creatinine of 0.3 mg/dl or more within 48 hours, at least 50% increase within one week, or oliguria (reduction in urine output <0.5 ml/kg/hr for more than 6 hours) were included in the study [2,9,10].

**Exclusion criteria-** The people excluded from the study are:

- Patients with known kidney disease,
- Established diabetic or hypertensive nephropathy,
- Connective tissue disorder
- Sickle Cell Disease
- Chronic Liver Disease

**Statistical Analysis-** The data was analysed and displayed using standard deviation, mean, percentage, and frequency. To identify potential correlations, we employed the chi-square test. A p-value less than 0.05 was considered to have statistical significance. Microsoft

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Excel was used for data entry, and the Statistical Package for the Social Sciences (SPSS Ver. 24) was utilised for analysis.

**Ethical-** This study was approved by the Ethical Committee of the MKCG Medical College & Hospital, Berhampur, Odisha.

## RESULTS

Male predilection was noticed in our study, with 52 males (61.2%) suffering from acute kidney injury and 33 females (38.8%) suffering from the same (Table 1).

**Table 1:** Distribution of AKI patients based on gender

| Gender | No. of patients (N) | Percentage (%) |
|---|---|---|
| Male | 52 | 61.2 |
| Female | 33 | 38.8 |
| Total | 85 | 100 |

Out of 85 patients studied, the majority belonged to the age group 41 to 60 years old (45 cases, 52.9%); followed by 23 patients (27.1%) from the age group more than 60 years old. Fourteen patients (16.5%) were seen in age groups 21 to 40. Most minor patients (3 cases, 3.5%) were found in the age group less than 20 years old. Mean age was to be 52.41±16.4 years. The youngest patient was an 18-year-old male, while the oldest was an 86-year-old male (Fig. 1).

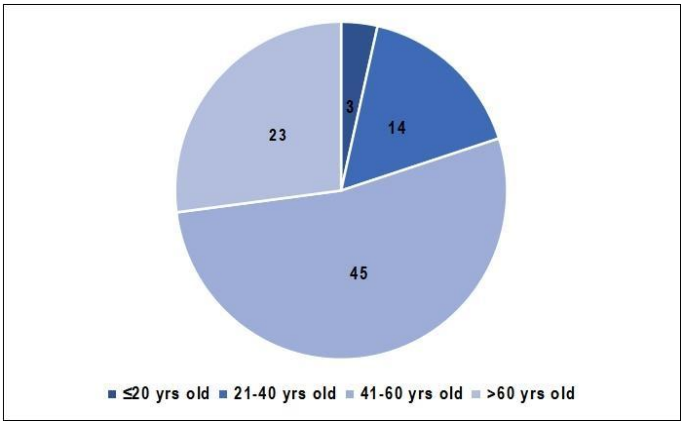


**Fig. 1:** Distribution of AKI patients based on age Group

Out of 85 patients, hypotension, fatigue, oliguria, fever, edema, jaundice, vomiting and diarrhoea were seen in 42 (49.4%), 42 (49.4%), 56 (65.9%), 11 (12.9%), 14 (16.5%), 15 (17.6%), 30 (35.3%) and 24 (28.2%) patients respectively (Fig. 2).

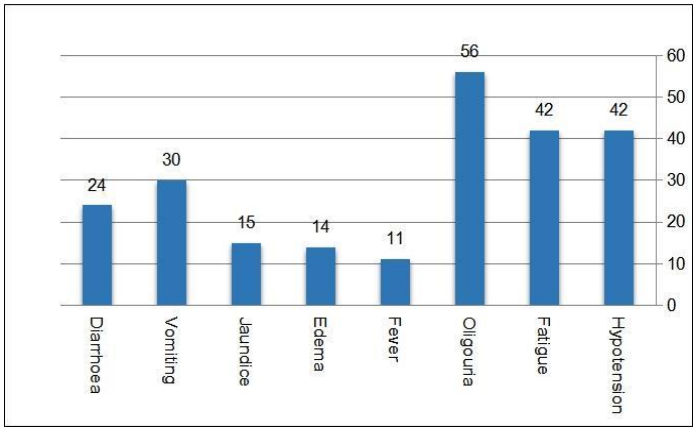


**Fig. 2:** Distribution based on symptoms/clinical features

In 48 patients (56.5%), the pathology of AKI was pre-renal, while in 28 patients (32.9%) reason was intrinsic renal. Pathology was post renal in nine patients (10.6%) (Fig. 3).

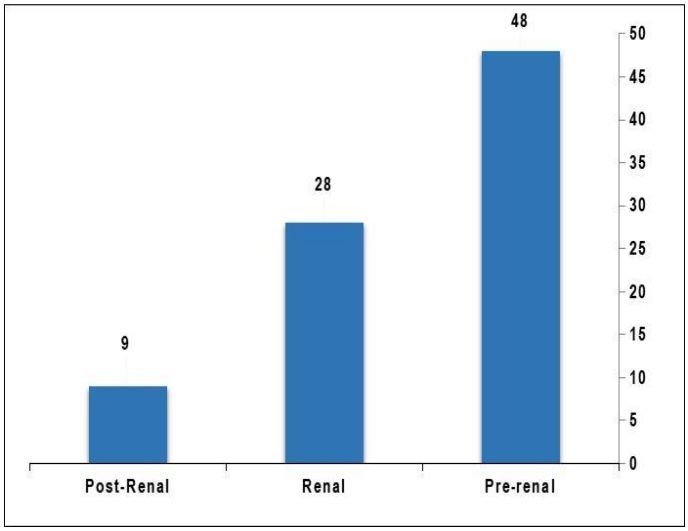


**Fig. 3:** Distribution Based on Pathology of Disease

In the table above, etiology of AKI is mentioned. Sepsis was seen to be the predominant cause of AKI (33 cases, 38.8%), followed by acute gastroenteritis (15 cases, 17.7%) (Fig. 4).

Various biochemical tests were done to attain a correct diagnosis. The above table shows quantitative data of various biochemical parameters as their mean values, standard deviation, and ranges. Mean values of urea, serum creatinine, serum sodium and serum potassium were 84.8, 3.68, 135.26 and 4.16, respectively (Table 2).

 

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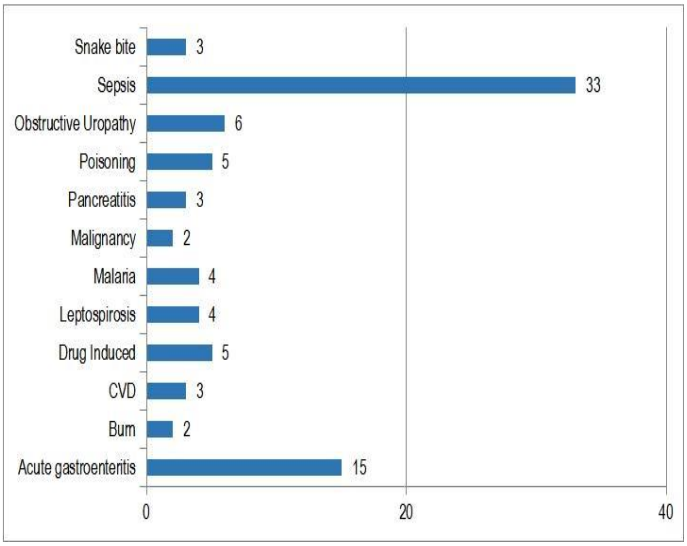


**Fig. 4:** Distribution of Etiology of Disease

**Table 2:** Distribution of laboratory data

| Parameter | Mean ±SD | Min-Max |
|---|---|---|
| Urea | 84.8±34.7 | 40-158 |
| Serum creatinine | 3.68±2.3 | 1.3-13.7 |
| Serum sodium | 135.26±4.3 | 124-142 |
| Serum potassium | 4.16±0.7 | 2-7 |

## DISCUSSION

An international issue is AKI [11]. Its frequency fluctuates depending on the study's target demographic and geographic areas. The pooled incidence rates of AKI in adult patients were 21.6–20%, according to one meta-analysis. AKI is related to high resource utilisation and unfavourable outcomes during hospital treatment [12-14].

Blood urea nitrogen (BUN) and creatinine are among the nitrogenous waste products that are retained, and the glomerular filtration rate (GFR) rapidly declines over hours to weeks. An increase in the BUN and/or plasma or serum creatinine (SCr) concentrations, frequently accompanied by a decrease in urine volume, are the standard diagnostic features shared by a diverse range of conditions collectively referred to as AKI. Patients with a wide range of diseases are susceptible to AKI, which is a widespread phenomenon [15-17]. The causes of AKI can range from sepsis to poisons such as snake venom to dehydration. These individuals can be readily handled in the early stages of AKI by ensuring a sound urine output, refraining from using nephrotoxic medicines, and keeping a sufficient fluid intake. However, AKI is a potentially deadly complication that is exceedingly difficult to control in the setting of many co-morbidities [18].

The fundamental mechanisms of IVK involve a decline in the kidney's capacity to eliminate nitrogenous waste, regulate intravascular volume, manage electrolytes, and support maintenance of the acid-base state. The clinical effects of KI vary depending on the clinical setting, but they often increase morbidity and mortality. Research has been conducted on dialysis patients' demographics, aetiology, severity, and outcome [19-21]. Additionally, KI has been investigated to identify heterogeneous factors related to adult and paediatric populations in urban and rural settings and developing and developed nations. Numerous criteria were developed to manage the disease to gauge its severity effectively. Extensive research has been conducted on these criteria to evaluate their effectiveness in teaching the disease course [22].

Because of India's diverse geography, climate, medical standards, and other factors, the country's aetiology, courses, and outlook vary widely globally and inside the country. The current investigation examined the epidemiology, clinical profile, prognostic factors, and KI outcome in patients hospitalised at an Odisha tertiary care institution [23-25]. Eighty-five hospitalised patients in the medical ward and finally acquired AKI were examined by the inclusion criteria in this hospital-based prospective observational research. In our analysis, the male-to-female ratio was 1.57:1, with a plurality of men [26]. The older age group was where AKI was most commonly found. Most patients (45 instances, or 52.9%) were 41 to 60 years old; 23 patients (27.1%) were 60 years or older. The age group over 75 years old accounted for the most significant number of patients in the Bagshaw et al. research, and this group also had the most significant incidence of AKI [28,29]. In all, 120,123 patients were admitted to the 57 I.U.s during the five-year study. The mean age deviation of these patients was 61.7±17.5 years, which is greater than our findings. Additionally, 59% of the patients were male. The study conducted by Prakash et al. found that the mean age of the patients was 44±17 years [30].

## CONCLUSIONS

One prevalent condition that makes hospitalized patients more difficult is AKI. Several intrinsic, pre-renal, and

 

post-renal factors cause AKI. Early intervention while the damage is still reversible and a strong index of suspicion is crucial for effective therapy. It was noted that the clinical characteristics nearly matched those of previous research. It was shown that the most common signs of acute renal damage were oligouria, hypotension, and vomiting. The primary cause of acute renal failure in our study was septicemia; leptospirosis, severe gastroenteritis, and malaria were additional common causes of renal failure. For the most part, patients received conservative care. Sepsis patients exhibited the highest fatality rate. Preventing the development of multiorgan failure is crucial, and treating it quickly to lower death rates is also important. Early diagnosis and care were likely the cause of the high survival rate, as we found.

## CONTRIBUTION OF AUTHORS

**Research concept-**Dr Susanta Kumar Nahak
**Research design-** Dr Luzoo Prachishree
**Supervision-** Dr Saraswathi Samantra
**Materials-** Dr Susanta Kumar Nahak
**Data collection-** Dr Luzoo Prachishree
**Data analysis and Interpretation-** Dr Saraswathi Samantra
**Literature search-** Dr Chandan Kumar Gantayat
**Writing article-** Dr Susanta Kumar Nahak
**Critical review-** Dr Chandan Kumar Gantayat
**Article editing-** Dr Chandan Kumar Gantayat
**Final approval-** Dr Luzoo Prachishree

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