

# HISTOLOGICAL PATTERN OF RENAL BIOPSY IN ACUTE KIDNEY INJURY

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## ABSTRACT

**Objective:** The objective of this study was to determine the histological pattern of acute kidney injury in local tertiary care hospital.

**Material and methods:** This descriptive was performed in department of medicine hayat abad medical complex Peshawar from January 2014 to December 2016. After detail history examination and investigations, all diagnosed patients of acute kidney injury were included in this study after informed consent. Well trained consultants performed the renal biopsy by use of an ultrasound guided automated biopsy gun. Two samples were taken one for histopathology and another for immune fluorescence. A sample was considered adequate if the biopsy yielded at least 10 glomeruli at light microscopy, one glomerulus at immunofluorescence microscopy. All patient were management according to standard treatment guidelines. Serological markers were also studied in clinically relevant cases.

Patient fulfilling the Kidney Disease Improving Global Outcome (KDIGO) following definition of acute kidney injury, Acute kidney injury is defined as any of the following: increase in serum creatinine (sCr) by  $\geq 0.3$  mg/dl ( $\geq 26.5$   $\mu$ mol/l) within 48 hours; or an increase in serum creatinine to  $\geq 1.5$  times baseline, which is known or presumed to have occurred within the preceding 7 days; or a urine volume  $< 0.5$  ml/kg/h for 6 hours.<sup>14</sup>

**Results:** A total of 81 patients were recruited in this study. Male gender dominated 56% female patients were 44%. Average age was 34 years ranging from 15 years to 78 years. Pauci-immune crescentic glomerulonephritis was the leading cause of acute renal failure reported of 24% biopsy specimens, followed by acute tubular necrosis found in 16% patients. Post-infectious glomerulonephritis were third prominent cause of acute renal deterioration accounting up to 12% renal biopsies followed by interstitial nephritis and IgA Nephropathy contributing 10% each. Anti-Glomerular basement membrane nephritis and focal segmental glomerular nephritis were documented in 6%. Of other minor causes Henoch-Schlelein like Purpura, systemic lupus erythematosus, light chain nephritis and nephrocalcinosis were reported in 4% each.

**Conclusion:** Renal biopsy is an important investigation in establishing the diagnosis of acute renal failure. Pausi-immune glomerulopathies and acute tubular necrosis are most common histological patterns in acute kidney injury.

**Key words:** Acute kidney injury, renal biopsy.

## INTRODUCTION

The kidney is critical in maintaining a stable internal environment by regulating the body fluid volume, maintaining electrolyte balance, and excreting potentially metabolic toxic end products. Glomerular filtration, tubular reabsorption, and tubular secretion are involved in forming urine.<sup>1</sup>

Acute kidney injury (AKI) is a complex clinical disorder that is associated with severe morbidity and mortality. Despite technological advances in renal replacement therapy, AKI continues to be associated with poor outcomes. Acute renal failure is a syndrome

of sudden loss of the kidney's excretory function, often with oliguria, which usually occurs over the course of hours to days.<sup>2</sup>

Acute kidney injury is common in hospital patients and more so in critically ill patients. It is frequent, harmful and potentially treatable condition.<sup>3</sup> In the majority of patients, recovery of the kidney function is usually seen; however, many patients remain dialysis-dependent or are left with severe renal impairment.<sup>4</sup>

The incidence rate of AKI around the world is not well known.<sup>5</sup> Very few data have been published regarding the incidence of ARI. An often-cited incidence rate (4.9%) was obtained using single-hospital data collected in 1979.<sup>6</sup> Investigators from the same group reported a higher incidence rate (7.0%) using single-center data 17 yr later. With a similar definition of acute renal failure, another study reported that 0.9% of patients presented with ARF at hospital admission.<sup>7</sup>

Many common causes of AKI in critically ill patients exist. Sepsis is the major cause of AKI, accounting for nearly 50% of cases.<sup>8</sup> Several studies have reported

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that sepsis-induced AKI is associated with short and long-term risk of death.<sup>9</sup> There is a stark contrast between AKI in the tropics and that in temperate zones; however, the basic pathophysiological changes and principles of management remain the same. In contrast to trauma, industrial accidents, drugs, cardiogenic shock and renal transplantation rejection being the common causes of AKI in the developed world, acute tubular necrosis due to community-acquired infections remains the commonest cause in the tropics.<sup>10</sup> Natural medicines, used by traditional healers, add to the burden of AKI in some tropical areas.<sup>11</sup> Two studies from India on patients with AKI over the past three decades have shown the percentage of medical, surgical and obstetrical conditions resulting in acute renal failure (ARF) as 60%, 25% and 15%; and 88%, 3.4% and 9%; respectively.<sup>12</sup>

Renal biopsy is often necessary for diagnosis, prognostic assessment and therapy guidance of various diseases affecting native and transplant kidneys. The final diagnosis differs from the main hypothesis in up to one third of cases.<sup>13</sup>

## MATERIAL AND METHODS

This descriptive was performed in department of medicine Hayatabad Medical Complex Peshawar from January 2014 to December 2016. After detail history examination and investigations, all diagnosed patients of acute kidney injury were included in this study after informed consent. Well trained consultants performed the renal biopsy by use of an ultrasound guided automated biopsy gun. Two samples were taken one for histopathology and another for immune fluorescence. A sample was considered adequate if the biopsy yielded at least 10 glomeruli at light microscopy, one glomerulus at immunofluorescence microscopy. All patient were management according to standard treatment guidelines. Serological markers were also studied in clinically relevant cases.

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### Exclusion criteria

Patient with acute or chronic renal failure and patient with inadequate renal biopsy were excluded from study.

## RESULTS

A total of 81 patients were recruited in this study. Male gender dominated 46(56%) female patients were

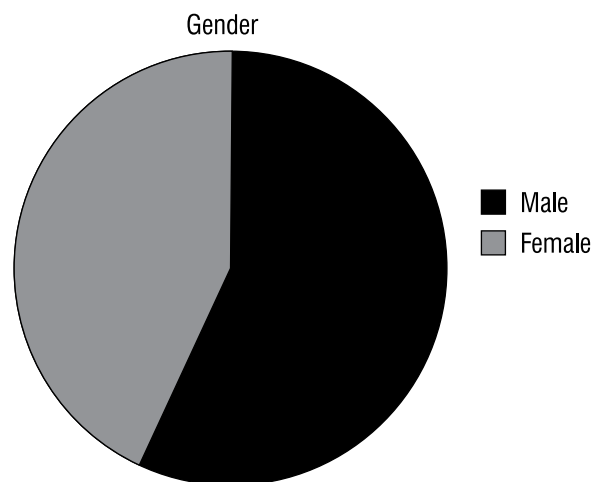


Fig:1 Gender distribution

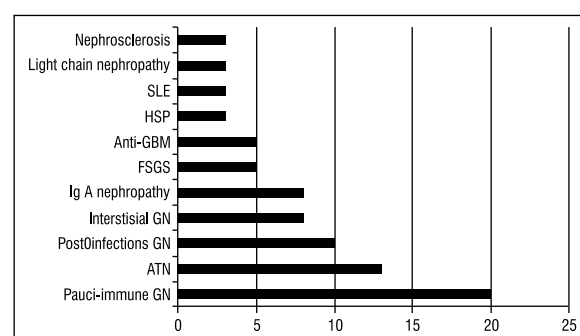


Fig: 2 Histological Pattern of Renal Biopsy in Acute Kidney Injury

35(44%). Average age was 34 years ranging from 15 years to 78 years.

Pauci-immune crescentic glomerulonephritis was the leading cause of acute renal failure reported of 20 (24%) biopsy specimens, followed by acute tubular necrosis found in 13 (16%) patients.

Post-infectious glomerulonephritis were third prominent cause of acute renal deterioration accounting up to 10 (12%) renal biopsies followed by interstitial nephritis and Ig A Nephropathy contributing 8(10%) each. Anti-Glomerular basement membrane nephritis and focal segmental glomerular nephritis were documented in 5(6%). Of other minor causes Henoch-Scholein like Purpura, systemic lupus erythematosus, light chain nephritis and nephrocalcinosis were reported in 3(4%) each.

## DISCUSSION

Acute kidney injury (AKI) is a complex clinical disorder that is associated with severe morbidity and mortality. Despite technological advances in renal replacement therapy, AKI continues to be associated with poor outcomes. Acute renal failure is a syndrome of sudden loss of the kidney's excretory function, often

with oliguria, which usually occurs over the course of hours to days.<sup>2</sup>

The time points when interventions should be recommended have been investigated and established in multiple fields of medicine. For patients with renal disease kidney biopsy can be necessary for diagnosis and treatment selection. Technical advances (e.g. real-time ultrasound and automated biopsy needles) improved the general implementation of this procedure.<sup>15</sup> Major complications occur in less than <0.1% of kidney biopsies.<sup>16</sup>

To reduce the severity of and improve recovery from AKI, it is important to identify the underlying cause of AKI. The etiologies of AKI are commonly categorized into prerenal, renal or postrenal. Prerenal AKI is due to impaired blood flow to the kidneys as a result of decreased blood volume, low circulating volume to the kidneys, and agents that reduce renal blood flow. Renal AKI is due to damage to the renal parenchyma, such as glomeruli, renal tubules and interstitium. Postrenal AKI is due to the obstruction of the urinary tract. The most common causes of AKI are frequently associated with infection, renal ischemia, and nephrotoxic drugs.<sup>17</sup>

The male gender were dominant in our study this observation was also seen in other studies as Juan M.<sup>18</sup> The mean age was almost similar to a local study Kazi et al.<sup>19</sup> Pauci-immune glomerulopathies and acute tubular necrosis were the leading histologic causes in our study in concordance with findings of Kazi et al.<sup>19</sup> Haas et al found Postinfectious GN, 5.5%; Anti-glomerular basement membrane antibody nephritis, 4.0%; and immunoglobulin A (IgA) nephropathy and/or Henoch-Schönlein nephritis, 3.6% Which were observe in similar percentages in our study.<sup>20</sup>

## CONCLUSION

Renal biopsy is an important investigation in establishing the diagnosis of acute renal failure. Pauci-immune glomerulopathies and acute tubular necrosis are most common histological patterns in acute kidney injury.

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