A Prospective Study of Incidence and Outcome of Acute Kidney Injury Patients Admitted in Medical ICU of Tertiary Care Center

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Abstract
Background: Acute Kidney Injury (AKI) is characterized by a rapid decline in glomerular filtration rate over hours to days. Before 2004 there more than 35 definitions in medical literature for AKI, so a wide range of incidence estimates for AKI from 1 to 25% of ICU patients and has led to mortality rate from 15 to 60%.

Aims and Objectives: 1. To study the association between AKI and death in MICU patients.
2. To study the age and sex distribution of AKI in MICU patients and their correlation with outcome.

Materials and Methods: The present study was carried out among patients of MICU of Sanjay Gandhi Hospital Rewa M. P. from January 2015 to December 2017. Total 5412 patients taken out for the study, of which 316 was AKI.

Results: The incidence of AKI was 5.8% in MICU and No difference was found between male and female in AKI, death in AKI patient was very high than non AKI patients.

Conclusion: the incidence of AKI is nearly 6% in our study and associated with significant mortality than non AKI patients irrespective of age and sex distribution.

Keywords: AKI, MICU, outcome.

Introduction
Acute kidney injury (AKI) is characterized by a rapid decline in glomerular filtration rate (GFR) over hours to days. In medical ICU for purpose of diagnosis and management cause of ARF are generally divided into three major categories:

1. Disease that cause renal hypo perfusion (prerenal AKI) (~55%).
2. Disease that directly involve the renal parenchyma (renal AKI) (~40%).
3. Disease associated with urinary tract obstruction (post renal AKI) (~5%).

The pattern of acute renal failure in India is changing albeit at a slower pace compared to that on developed countries. The most common etiologic factor of AKI in MICU is sepsis.
followed by acute diarrhea, malaria (in India),
cardiogenic shock and obstructive uropathy.
In 2004 the Acute Dialysis Quality initiative
(ADQI) work group set forth a definition and
classification system for ARF, described by the
acronym RIFLE (Risk of renal dysfunction, Injury
to the kidney, Failure or Loss of kidney function,
and End stage kidney disease)

Table no. 1 showing various stages of acute kidney disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>GFR Criteria</th>
<th>Urine output criteria</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>S.Creat. increased×1.5 OR GFR decreased &gt; 25%</td>
<td>UO &lt;0.5 ml/kg/hr.× 6 hrs.</td>
<td>High sensitivity (risk&gt;injury &gt;failure)</td>
</tr>
<tr>
<td>Injury</td>
<td>S.Creat. increased×2 OR GFR decreased &gt; 50%</td>
<td>UO &lt;0.5 ml/kg/hr.× 12 hrs.</td>
<td>High sensitivity (risk&gt;injury &gt;failure)</td>
</tr>
<tr>
<td>Failure</td>
<td>S.Creat. increased×3 OR GFR decreased &gt; 75% OR S.Creat. ≥4 mg/dl Acute rise ≥ 0.5mg/dl</td>
<td>UO &lt;0.3 ml/kg/hr.× 24 hrs.(oliguria) OR Anuria × 12 hrs.</td>
<td>High sensitivity (risk&gt;injury &gt;failure)</td>
</tr>
<tr>
<td>Loss</td>
<td>Persistent acute renal failure: complete loss of kidney function &gt; 4 weeks.</td>
<td>High sensitivity</td>
<td></td>
</tr>
<tr>
<td>ESKD</td>
<td>Complete loss of kidney function &gt; 3 months</td>
<td>High sensitivity</td>
<td></td>
</tr>
</tbody>
</table>

Material and Methods
The present study was carried out among in
patient of MICU of SGMH Rewa from January
2015 to December 2017, over the period of one
year. Total 5412 patients have been screened out
of which 316 patients of AKI chosen with using
standard clinical and laboratory criteria.

Inclusion Criteria
1. Patient admitted in MICU SGMH Rewa,
2. Age more than 15 years,
3. Serum creatinine level should be more
   than 0.3 mg/dl rise from base line or more
   than 1.5mg/dl at least one time after
   admission in MICU.

Exclusion Criteria
1. Age less than 15 yrs,
2. Known case of chronic renal failure,
3. Serum cr. never become more than
   1.5mg/dl during admission,
4. Any surgical case of ARF apart from
   admitted in MICU due to predominantly
   medical cause.

Diagnostic criteria of AKI:
1. Elevation of serum creatinine should be
   more than 0.3 mg/dl rise from base line or
   more than 1.5mg/dl within 48 hr of
   admission.
2. Reduction in urine output less than
   0.5ml/kg/hr for more than 6 hr

Results
The incidence of AKI was 5.8% in MICU. Out of
5412 patients 316 was AKI. The male patient’s
admission in MICU was higher 61.02 %
(3302/5412) than female patients 38.98%
(2110/5412). The incidence of AKI was similar in
male and female patients 61.02 and 62.1%
respectively. Nearly half of the patients (44.91%) admitted in MICU where more than 50 years of age and AKI is also more common (43.98%) in older age patients (>50 yrs.).In adult population (15-30) AKI was more prevalent in female group while in older age group AKI was more common in male. The mortality was significantly higher in AKI group of patients (45.88%) than non AKI group where mortality was only 18.10%.
Figure-1

Incidence of AKI in MICU patients

Table no. 2 showing Incidence of AKI as per sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total</th>
<th>AKI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>3302</td>
<td>61.02</td>
</tr>
<tr>
<td>female</td>
<td>2110</td>
<td>38.98</td>
</tr>
<tr>
<td>Total</td>
<td>5412</td>
<td></td>
</tr>
</tbody>
</table>

Figure no. 2

Table no. 3 Age wise distribution in AKI patients

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Total</th>
<th>AKI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>15-30</td>
<td>1362</td>
<td>25.17</td>
</tr>
<tr>
<td>30-50</td>
<td>1619</td>
<td>29.92</td>
</tr>
<tr>
<td>&gt;50</td>
<td>2431</td>
<td>44.91</td>
</tr>
<tr>
<td>Total</td>
<td>5412</td>
<td></td>
</tr>
</tbody>
</table>

Table no. 4 shows association of death and AKI

<table>
<thead>
<tr>
<th>PATIENTS</th>
<th>TOTAL</th>
<th>DEATH</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non AKI</td>
<td>5096</td>
<td>921</td>
<td>18.1</td>
</tr>
<tr>
<td>AKI</td>
<td>316</td>
<td>145</td>
<td>45.88</td>
</tr>
<tr>
<td>Total</td>
<td>5412</td>
<td>1066</td>
<td>19.69</td>
</tr>
</tbody>
</table>
Discussion
A study by Rinaldo et al the incidence of AKI in ICU patients has widely ranging between 1 to 25%\(^{(1)}\). In our study the incidence was nearly 6%. The low incidence in our study may be due to we had only included medical intensive care unit patients not any surgical patients, and we excluded any CKD patients. A multicenter study on nearly 30 000 patients by Shigehiko et al reported 5.7% incidence of AKI in critically ill patients\(^{(2)}\). Osteomann M et al using the RIFLE classification has been found Risk Injury and Failure approximately 17%, and 7% respectively\(^{(3)}\). The mean age of AKI developed in intensive care unit is generally more than 40 yrs. In our study it was 48.11 yrs. J prakash et al reported mean age was 44.9±17 yrs\(^{(4)}\). The older age is more prone to develop AKI due to low resistance power, more systemic and infective disease prevalence. The association of death in AKI patients in intensive care unit is very high nearly 30 to 60% in different studies. The variation may be due to available facilities in ICU, differ etiology and studies definition. Levy EM et al reported 37% vs 7% death in AKI patients than Non-AKI in ICU patients\(^{(5)}\). In our study the mortality of AKI patients was 45.88% where as it was only 18.10% in Non-AKI patients.

Conclusion
The incidence of AKI is nearly 6% in our study and associated with significant mortality than non AKI patients irrespective of age and sex distribution.

Consent
All authors declare that written informed consent was obtained from the patient for publication in consent form

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Competing Interest
All authors declared that no competing interest exist.

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