

# ROLE OF RENAL RESISTIVE INDEX AS AN EARLY PREDICTOR OF ACUTE KIDNEY INJURY IN SEPTIC PATIENTS

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## Introduction

Sepsis is a life-threatening organ dysfunction caused by a dysregulated host response to infection, it is characterized by cellular damage and the production of pro- and anti-inflammatory mediators, frequently leading to organ dysfunction. Globally, sepsis and septic shock harm millions of people annually, with mortality up to 1:4 (and frequently more) attributed to these serious medical conditions.

A frequent consequence in critically ill patients is sepsis-associated acute kidney damage (S-AKI), which raises the risk of long-term comorbidities and has a very high mortality rate.

Doppler based renal arterial resistive index (RRI) is defined as (peak systolic velocity – end diastolic velocity)/peak systolic velocity. The normal range is 0.50-0.70. Higher values are linked to a worse prognosis in kidney transplant recipients and other renal diseases. Because the index reflects pulsatility in renal arteries, it might be useful for the early detection of microvascular damage occurring in sepsis associated acute kidney injury.

## Aim of the Work

The aim of this study was to detect the predictive value of early renal resistive index (RRI) for occurrence of acute kidney injury in septic patients, and its reversibility if occurred.

## Patients and Methods

This was a prospective study that was conducted on 40 adult septic patients of both sexes, who were admitted to the critical care medicine department in Alexandria main university hospital 2023/2024, with the diagnosis of sepsis according to (Sepsis-3) definition.

Doppler-based renal resistive index (RRI) was performed on admission on all patients. Then according to diagnosis of AKI, patients were classified into 3 groups (No AKI, transient AKI, and persistent AKI).

## Results

**Table 1 :** RRI of the studied groups on admission

	Total (n=40)	No AKI (n=7)	Transient (n=18)	Persistent (n=15)	F	p
Min. – Max.	0.60 – 0.86	0.60 – 0.78	0.69 – 0.84	0.74 – 0.86	17.584*	<0.001*
Mean ± SD.	0.77 ± 0.06	0.69 ± 0.06	0.77 ± 0.04	0.81 ± 0.04		
Median (IQR)	0.78 (0.73–0.82)	0.70 (0.66–0.71)	0.76 (0.73–0.79)	0.81 (0.79–0.84)		
Sig. bet. grps.	p <sub>1</sub> = 0.001*, p <sub>2</sub> < 0.001*, p <sub>3</sub> = 0.024*					

IQR: Inter quartile range

SD: Standard deviation

F: F for One way ANOVA test, Pairwise comparison bet. each 2 groups was done using Post Hoc Test (Tukey)

p: p value for comparing between the three studied groups

p<sub>1</sub>: p value for comparing between No AKI and Transient

p<sub>2</sub>: p value for comparing between No AKI and Persistent

p<sub>3</sub>: p value for comparing between Transient and Persistent

\*: Statistically significant at p ≤ 0.05

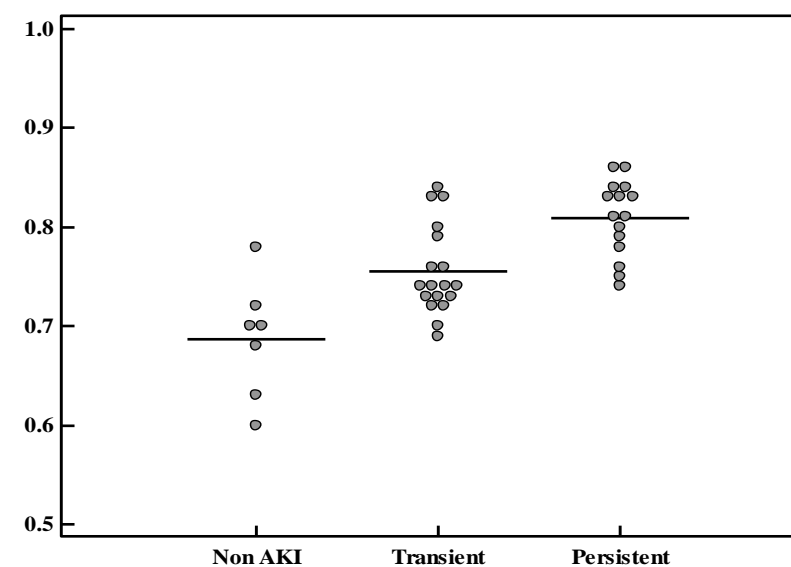
**Table 2:** Mortality amongst the studied groups

Mortality	Total (n=40)		No AKI (n=7)		Transient (n=18)		Persistent (n=15)		χ <sup>2</sup>	MC <sub>p</sub>
	No.	%	No.	%	No.	%	No.	%		
No	33	82.5	7	100.0	16	88.9	10	66.7	3.746	0.146
Yes	7	17.5	0	0.0	2	11.1	5	33.3		

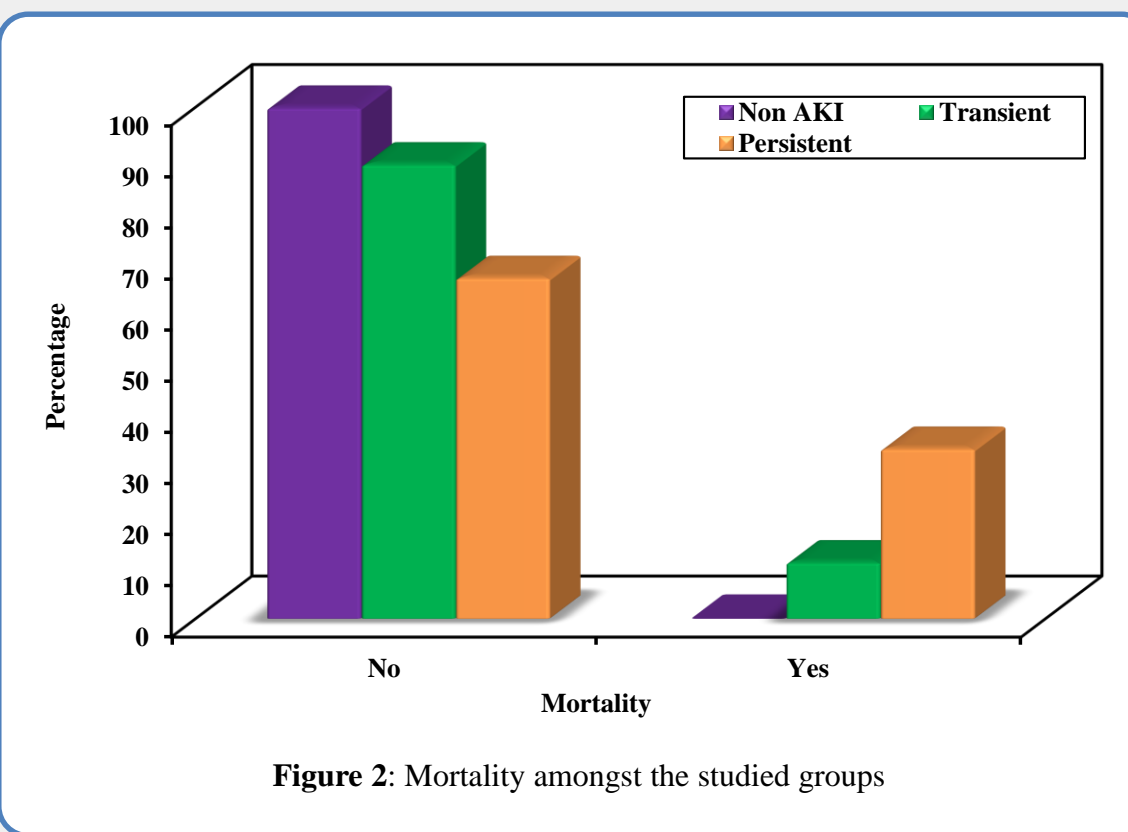
χ<sup>2</sup>: Chi square test

MC: Monte Carlo

p: p value for comparing between the three studied groups



**Figure 1:** RRI of the studied groups on admission



**Figure 2:** Mortality amongst the studied groups

## Conclusion

Among critically ill patients, RRI is a noninvasive, quick, enables evaluation of renal hemodynamics. RRI on admission was the most significant risk factor for AKI with high sensitivity and specificity. Persistent AKI showed higher mortality than Transient AKI, however, it was not statistically significant.

Early identification using RRI and intervention for high-risk patients might improve outcomes. Further research is needed in larger populations and development of RRI-based risk models and preventive interventions.