COMPARATIVE ANALYSIS OF SERUM CREATININE(SCR), KIDNEY INJURE MOLECULE-1(KIM-1) AND URINE NEUTHROPHIL GELATINASE ASSOCIATED LIPOKALIN (uNGAL) BIOMARKERS LEVELS FOR DETERMINING AKI IN LBW INFANTS

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Background and Aim

AKI is one of the most severe complications of hypoxia-ischemia in LBW infants in NICU due to the centralization of blood flow to the brain and reduction of the renal blood flow. During AKI renal tubular cells are damaged, which engenders renal dysfunction and oliguria. Even though sCr is currently applied as the gold standard for determining renal dysfunction, it cannot be used as the early and informative biomarker of kidney injury in LBW infants due to known physiological reasons of infants. Consequently, in our study, we have used novel and non-invasive biomarkers of kidney injury, KIM-1 and uNGAL, and compared standard and new methods of determination of kidney injury in LBW infants.

Materials and Methods

122 infants have been involved in this assessment. We have divided them into two major groups – the main group: 72 LBW infants with AKI (GA=28-36 weeks) and the control group: 50 infants (n=30 LWB and n=20 term infants). Urinary and serum samples were collected on days 1-3 and 5-7 to determine KIM-1 and uNGAL levels and sCr in blood respectively. In addition, Doppler ultrasound test of renal arteries was conducted to determine RI. KIM-1 and uNGAL were quantified by ELISA method. The results were compared by the Mann-Whitney test; the correlation was determined by Spearman's rank-order correlation.

Results

RI, KIM-1, NGAL are significantly higher in the main group than in the control group ($p<0.01$). NGAL decreases in on days 5-7, but KIM-1, RI remain constant ($p<0,01$). sCr remained within normal levels during the first few days and it is increased on days 5-7($p<0,01$) (Table 1). Positive correlation appears between RI and KIM-1 ($r=0.78$, $p<0.01$), RI and uNGAL ($r=0.85$, $p<0.01$) on days1-3; and on days 5-7, RI and KIM-1 ($r=0.69$, $p<0.01$), RI and uNGAL ($r=0.806$, $p<0.01$). Furthermore, there is a positive correlation between sCr and KIM-1 ($r=0.79$, $p<0.01$),
sCr and uNGAL ($r=0.69$, $p<0.01$) only on days 5-7. There appears to be no correlation between sCr, KIM-1, and uNGAL on days 1-3. (Table 1)

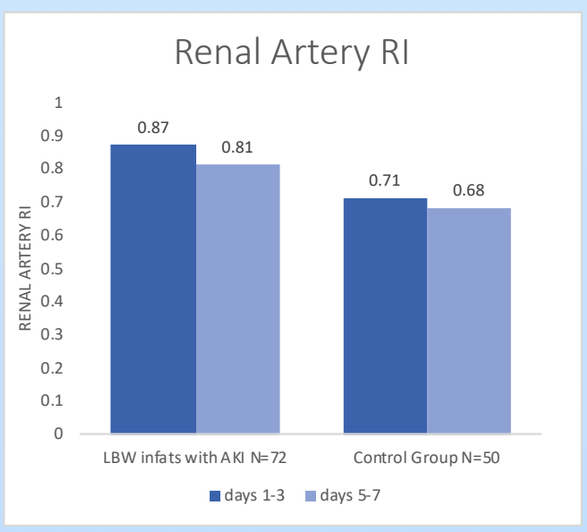

Figure 1

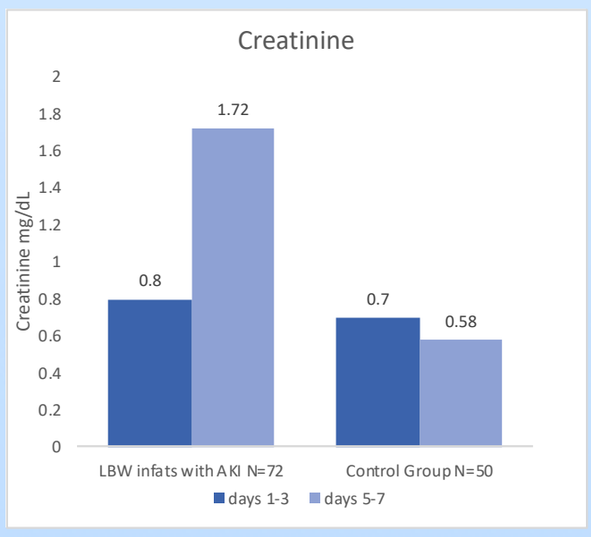

Figure 2

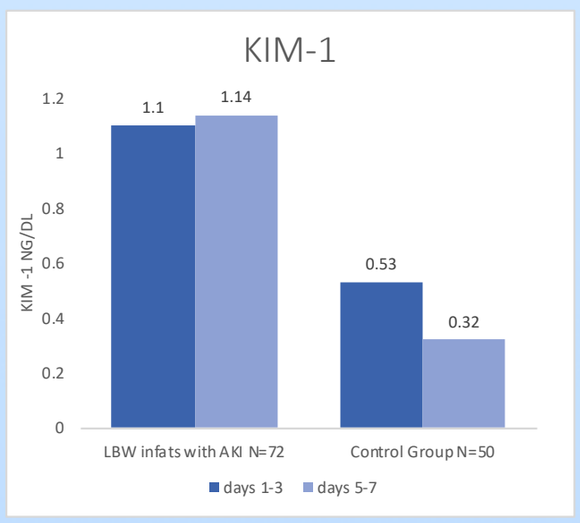

Figure 3

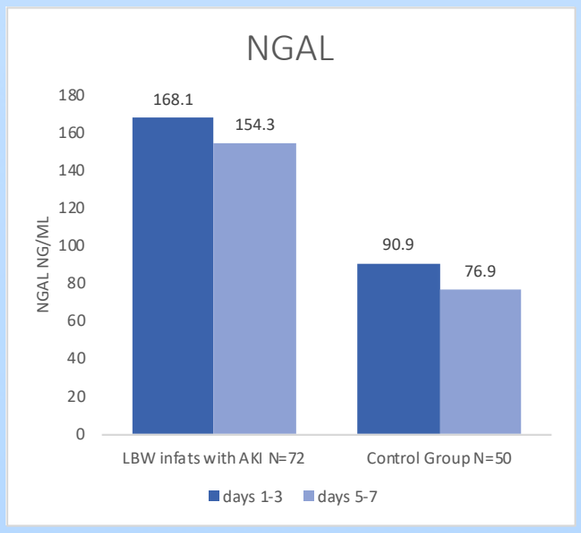

Figure 4

*p<0,01-relative to the control group

Table 1

Biomarkers	Days	Correlation
RI and KIM-1	1-3	R=0.78 p<0.01
	5-7	R=0.69 p<0.01
RI and uNGAL	1-3	R=0.85 p<0.01
	5-7	R=0.806 p<0.01
sCr and KIM-1	5-7	R=0.79 p<0.01
sCr and uNGAL	5-7	R=0.69 p<0.01

Note: There is no correlation between sCr, KIM-1, and uNGAL on days 1-3

Conclusion

Despite the beginning of ischemia in the kidneys (indicated by high RI, KIM-1, uNGAL levels), the sCr level remains constant on days 1-3. This indicates that in comparison to sCr, KIM-1 and uNGAL are more reliable and informative early biomarkers for diagnosis of AKI in LBW infants.

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