Introduction:
The ratio between venous-arterial PCO2 difference and arterial-venous O2 content difference (Pv-aCO2/Ca-vO2) has been recognized as an alternative marker of global anaerobic metabolism. Renal resistive index (RRI) has recently been proposed to detect renal tissue hypoxia and consequent acute kidney injury. The main objectives of our study were to evaluate whether the Pv-aCO2/Ca-vO2 ratio and RRI are associated and their implications to mortality in ICU patients.

Methods:
Prospective observational study, including mechanically ventilated patients except those with pre-existing chronic kidney injury. Clinical and laboratory data, SOFA score Pv-aCO2/Ca-vO2 ratio and RRI measurements were obtained within the first 24 hours of ICU admission.

Results:
A total of 168 patients (median age 62 years, 58% males, SOFA score 9±1) were included. Shock was present in 53.6% of them. Median (IQR) Pv-aCO2/Ca-vO2 ratio and RRI values were 1.54 (1-2.58) and 0.77 (0.70-0.83) respectively.

There was a statistically significant correlation between Pv-aCO2/Ca-vO2 ratio and the presence of shock (p=0.017) as well as with the SOFA score (p=0.037).

A statistically significant correlation was also observed between RRI, Pv-aCO2/Ca-vO2 ratio and ICU survival (p<0.001). High RRI (mean 0.80) and high Pv-aCO2/Ca-vO2 ratio (mean 1.97) were linked to an increased risk of ICU mortality. Stratified analysis by lactate level revealed statistically significant correlation between Pv-aCO2/Ca-vO2 ratio and RRI (p<0.01). Pv-aCO2/Ca-vO2 ratio and RRI were positively correlated for lactate value ≥2 (rho=0.343).

Conclusion:
Pv-aCO2/Ca-vO2 correlates positively with RRI, indicating tissue hypoxia. Consequently, their combination could serve as a complementary tool for clinical outcome assessment and for a better management of critically ill patients, especially those in shock states.