Renal impairment in very low birth weight infants: role of drugs and potential biomarkers

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Background. Renal damage is one of the most commonly reported injuries among preterm neonates, especially Very Low Birth Weight (VLBW) infants 1; however, the lack of specific markers to monitor renal function often delays diagnosis. This study described drug exposure and renal outcomes in preterm newborns. It is part of a larger project aiming to identify useful biomarkers for the early recognition of renal damage by drugs in the preterm newborns.

Methods. Babies born preterm and weighing less than 1,500 g at birth were enrolled in a prospective cohort observational study (EC protocol n. 154/2015/U/Oss) at the tertiary-level NICU of the Sant'Orsola-Malpighi Hospital (Bologna) between 01/06/2016 and 31/12/2016, after obtaining informed consent from their parents. Exclusion criteria were as follows: death within 48 h after birth, genitourinary tract malformation, heart diseases or syndromic status. Alteration of renal function (ARF) was defined as the lack of decrease in serum creatinine concentrations during the first weeks after birth and/or oliguria (<1mL/kg/h). Blood samples were collected at least twice a week for each baby during the first 21 days after birth, and thereafter analyzed to obtain serum creatinine (sCr) and serum cystatin C (sCysC) concentrations. Also data on exposure to combination of potential nephrotoxic drugs for cycles longer than 24 h were collected. Statistical analyses were carried out by using R software.

Results. 21 babies were enrolled, 6 of them were included in ARF group, whereas 15 had normal renal function (NRF group). ARF babies had lower gestational age (p=.03) and lower birth weight (p=.03) compared to NRF babies; the two groups were comparable for prenatal exposure to tobacco, corticosteroids and drugs used for threatened preterm labour. ARF babies were more likely to suffer from sepsis compared to NRF group (p=.05), whereas no differences were found for other considered pathological conditions. Higher sCr values during second week of life were registered for ARF babies compared to NRF (p=.02), no differences between groups were found for sCysC values. Regarding exposure to combination of nephrotoxic drugs, it was comparable in the two groups; antibacterials were most used drugs in combination.

Conclusions. This study showed that babies with altered renal function had lower gestational age, lower birth weight and higher incidence of sepsis compared to other VLBW babies. The alteration of renal function in our cohort of VLBW was independent from exposure to combination of nephrotoxic drugs. These results should be confirmed in larger cohort studies; moreover, this analysis highlighted the need of novel biomarkers to precisely identify renal damage and to characterize renal site of damage in this population.

1 Koralkar R et al. Pediatr Res. 2011;69:354–8.