Relationship of gestational age and birthweight with renal function measured at 5 years of age in children on follow up program Kangaroo Mother House Alfa, Cali Colombia

SISTER RENAL CENTER-SRC- PROGRAM : CHILDREN’S HOSPITAL BOSTON (CHB) USA-FUNDACION VALLE DEL LILI (FVL) CALI-COLOMBIA A LEVEL

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**Introduction**

Nowadays, the low weight and height newborn (preterm or with intrauterine growth restriction) is considered as a public health problem. It is estimated that nearly 13.7 million term newborns fall in the low birth weight category, standing for 11% of all newborns in developed countries. Intrauterine Growth Restriction (IUGR), taken as a birth weight below the 10th percentile, accounts for 75% of infant mortality. Extreme Prematures (<1000 gm), usually also less than 30 weeks gestational age, have a lower number of glomeruli and thus would be at a major risk of glomerular lesion, including also inadequate nutrition and nephrotic medication. The effect of IUGR over the kidneys has been demonstrated in animal experimentation consistent in a diminished number of glomeruli and glomerular hyperfiltration, considered as a predisposing factor for early hyperfiltration, proteinuria and arterial hypertension.

**Objectives**

Main: To describe a relationship between gestational age and birthweight with traditional renal function measurements in children with 5 years of age from the program Kangaroo Mother House Alfa, Cali. Colombia.

Specifics: 1. To correlate serum creatinine, uric acid, urinary Prot/Creat, FENa, and renal ultrasound in children at 5 years old with their birthweight and gestational age. 2. To adjust the described correlations for covariates, such as anthropometric measurements and gender. 3. Use urinary biomarkers as renal to classify renal risk - CKD.

**Expected outcomes:** We will determine the outcomes of patients with IUGR, in terms of renal function, systolic and diastolic blood pressure, kidney length and the presence or absence of proteinuria in the first five years of life after a traumatic event as extreme prematurity as, in an cross sectional analysis, in terms to initiate prospective and collaborative study in the region.

**Methods**

**Study population:** The study population will be children admitted and followed up in the program Kangaroo Mother House Alfa- Cali, during the last five years, Oct 2011 to Nov 2012.

This is a descriptive study, where there’s going to be a transversal cut by age group; it is planned to take children about 5 and 7 years of age (± 3 months) 100 patients each one with 100 respective controls, and to apply to them the measurements and variables proposed: anthropometric and blood pressure measurements, blood samples for electrolytes, Phosp, Mg, urea, creatinine using the standards lab methods, and for serum and urine creatinine we used an Enzimatic method.

**We obtain urine samples for urinary biomarkers:** N-GAL, KIM-1, L-FABP and NAG and they were frozen at – 80 °C in a dedicated freezer in the research lab (these urine samples will be sent to BW&H Boston to Dr. J Bonventre lab).

The Inclusion Criteria were Patients admitted and being followed up by the program Kangaroo Mother House Alfa – Cali belonging to 5, 7 years of age (± 3 months), with information on their weight and gestational age, and without congenital and renal abnormalities. Consent from the parents to participate, and approbation from ethical Committee was obtained.

**Results**

**Girls vs. Boys**

- **Current BMI:**
  - Birth weight vs. Current BMI
  - Birth weight vs. Current BMI (quartiles)

- **Systolic arterial pressure:**
  - Birth weight vs. Systolic arterial pressure
  - Birth weight vs. Systolic arterial pressure (quartiles)

- **Diastolic arterial pressure:**
  - Birth weight vs. Diastolic arterial pressure
  - Birth weight vs. Diastolic arterial pressure (quartiles)

- **Left Kidney volume estimation:**
  - Birth weight vs. Left Kidney volume estimation
  - Birth weight vs. Left Kidney volume estimation (quartiles)

- **Creatinine:**
  - Birth weight vs. Creatinine
  - Birth weight vs. Creatinine (quartiles)

- **Uric Acid:**
  - Birth weight vs. Uric Acid
  - Birth weight vs. Uric Acid (quartiles)

- **FENa:**
  - Birth weight vs. FENa
  - Birth weight vs. FENa (quartiles)

- **Glomerular filtration rate (GFR):**
  - Birth weight vs. Glomerular filtration rate
  - Birth weight vs. Glomerular filtration rate (quartiles)

- **Creatinine clearance:**
  - Birth weight vs. Creatinine clearance
  - Birth weight vs. Creatinine clearance (quartiles)

- **Creatinine levels:**
  - Birth weight vs. Creatinine levels
  - Birth weight vs. Creatinine levels (quartiles)

- **Uric Acid levels:**
  - Birth weight vs. Uric Acid levels
  - Birth weight vs. Uric Acid levels (quartiles)

- **FENa levels:**
  - Birth weight vs. FENa levels
  - Birth weight vs. FENa levels (quartiles)

- **Glomerular filtration rate (GFR) levels:**
  - Birth weight vs. Glomerular filtration rate levels
  - Birth weight vs. Glomerular filtration rate levels (quartiles)

- **Creatinine clearance levels:**
  - Birth weight vs. Creatinine clearance levels
  - Birth weight vs. Creatinine clearance levels (quartiles)

**Results (cont.)**

We recruited 86 SGA patients, 52.3% male gender with mean age 59.9 months with SD 2, mean GA 31.3 weeks and SD 3.1, mean birthweight 1570 grs and 618 SD, mean present weight 17 200 grs and mean present height 107.2 with SD 4.1. There were not differences in the laboratory tests.

- **Fig 1.** Relationship of birthweight’s quintiles and BMI, by gender. The relationship is evident in girls, but not enough clear in boys, specially for the quintile 4 in boys (it observes a little bit in girls). It is possible that this quintile represents better the IUGR newborns, and not only the prematurity.

- **Fig 2.** Relationship between systolic blood pressure and birthweight.

- **Fig 3.** Relationship between diastolic blood pressure and birthweight.

- **Fig 4.** Differences between borns less or equals 1150 grs and right kidney volume, by genders.

- **Fig 5.** It is evident in girls and boys.

- **Fig 6.** Evident relationship in both genders

- **Fig 7.** We show the relationship between quartiles of birth weight and total kidney volume, measured in children 5 years of age. Both right and left kidney volume measured by ultrasonography were added, and patients in the first quartile were <1150 grams of body weight at birth. The P-value for the comparison among quartiles was 0.02.

**Conclusions**

We are recruiting the 5 years (+/- 3 months) controls. The data from urinary biomarkers in both groups will be added and analyzed in the final report.

1. There is a relationship of birthweight’s quintiles and BMI. It was not possible differentiate between IUGR or prematurity.

2. We couldn’t find significative alterations in the laboratory tests like FENa, prot/creat urine ratio.

3. There is a slight relationship between systolic blood pressure and birthweight < 1250 grs (not significative). 4. The most significative finding is less kidney volume, specially left kidney, in patients less than 1250 grs (p < 0.02). 5. Maybe using urinary biomarkers, as it is planned in the research protocol, we can find others significative predictors of renal alterations.

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