The contribution of breast and formula feeding to the body burden of aluminium in infants (0-12 months)

Isabel Rodriguez¹, Subramanian Mahadeva-Bava² & Christopher Exley¹

¹The Birchall Centre, Lennard-Jones Laboratories, Keele University, Staffordshire, ST5 5BG, UK

²Consultant Paediatrician and Paediatric Gastroenterologist, Russells Hall Hospital, Dudley, West Midlands, DY1 2HQ, UK

i.rodriguez.nunez-milara@keele.ac.uk

1- Background and aims

Breastmilk and infant formulas are the only source of nutrition in newborn infants. Infant formulas are known to be contaminated by aluminium, exposure to which in infants is associated with anaemia, bone disease and impaired neurological development^{1,2}.

The literature on feeding in healthy newborns and exposure to aluminium is extremely scarce.

Here we describe the first clinical trial to establish the contribution of infant formula and breastmilk feeding to the body burden of aluminium in term-infants. The first data on urinary excretion of aluminium and silicon are presented.

2- Methods

Ethical approval was obtained for the study (REC Ref. 14/WM/1114) and 23 healthy term-infants were recruited through Russells Hall Hospital, Dudley, United Kingdom.

Urine samples were collected using U-bags at the following times:

After birth 6 weeks 3 months 6 months 12 months

Breastmilk samples were collected from breast-feeding mothers (1mL).

Information on Infant formula feeds were collected from all mothers (powder and ready to drink).

Total aluminium and silicon in urine, breastmilk and infant formulas was measured using established methods^{3,4}. Briefly, microwave-assisted acid digestion followed by TH GFAAS.

Urine creatinine was measured by UV/Vis. Urinary excretion of Al and Si are expressed per mmol creatinine

3- Results

The data presented in Figures 1 & 2 are for urine samples collected within the first 48 hours of birth.

Data for breastmilk, infant formulas, and urine data for the periods, 6 weeks, 3, 6 and 12 months are currently being processed and are not presented herein.

Aluminium

Fig 1. Urinary aluminium excretion (nmol/mmol Cr) in 19 healthy newborns. The mean±SD of the values shown is 1708.7±1905.5 nmol/mmol Cr. Data ranged from 166 to 8641nmol/mmol Cr.

Silicon

Fig 2. Urinary silicon excretion (µmol/mmol Cr) in 19 healthy newborns. The mean±SD of the values shown is 5.9±3.9 µmol/mmol Cr. Data ranged from 0.7 to 12.5 µmol/mmol Cr.

References

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4- Conclusions

- There are no previous data of urinary excretion of silicon in newborns infants. The mean measured herein is **significantly lower than previous measurements for healthy adults** (32.1 ± 9.4 µmol/mmol Cr)⁵.
- Mean urinary aluminium measured herein is **significantly higher than a previous study** (210 ± 0.12 nmol/mmol Cr)⁶ where the gestational age of neonates was between 32 to 40 weeks. The age at which urine samples were taken was between 7 and 45 days.
- This study is **ongoing**.