BONE MATURATION AS A PREDICTIVE FACTOR OF CATCH-UP GROWTH DURING THE FIRST YEAR OF LIFE IN BORN SMALL FOR GESTATIONAL AGE INFANTS: A PROSPECTIVE STUDY

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BACKGROUND

About 85-90% of children born small for gestational age (SGA) experience a catch-up growth that occurs mostly during the first year of life and results in a full stature recovery by the age of 2. The remaining 10-15% do not undergo compensatory growth, achieving - if untreated - an adult height approximately 20 cm below their peers.

OBJECTIVE

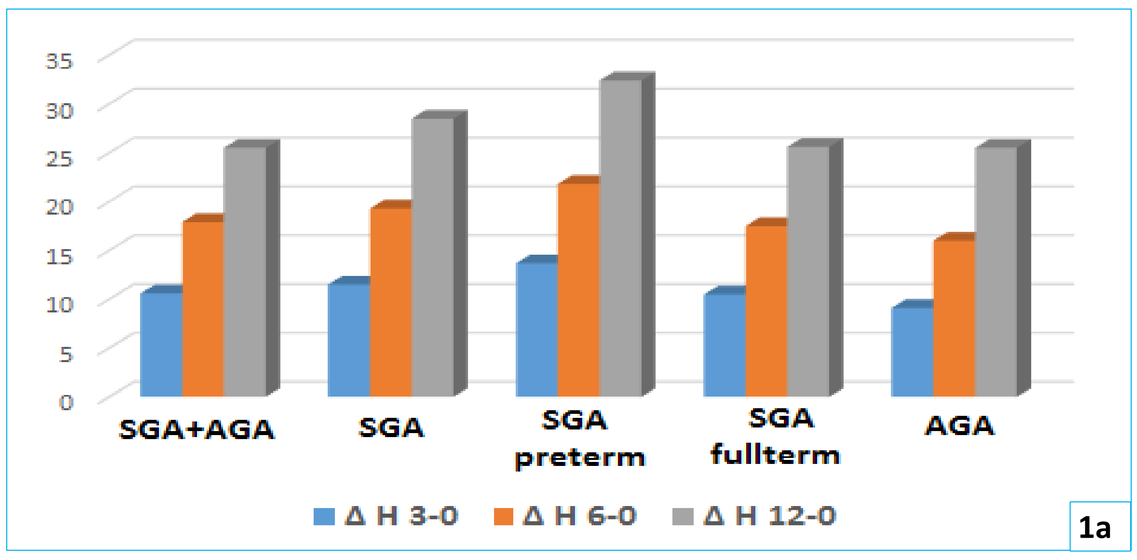
The aim of this prospective one-center study was to investigate the relation between **bone maturation (BM)** and **catch-up growth** during the first year of life in SGA infants.

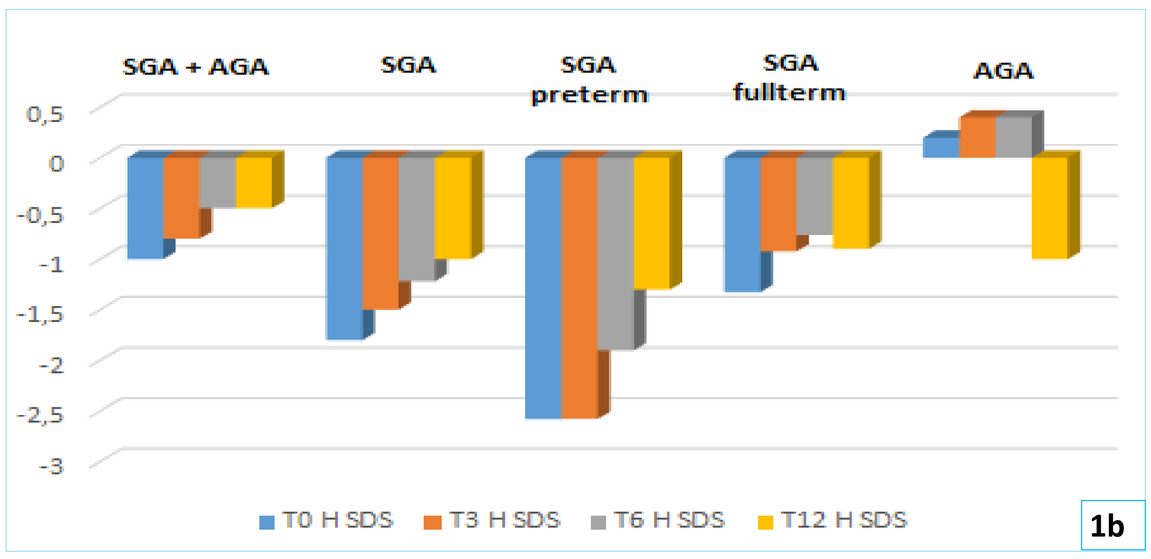
METHODS

Newborns whose weight and/or length was <-2 SD for gestational age were classified as SGA.
The study included a group of **32 SGA**, **21** of which **full-term** (37-41 gestation weeks GW, subgroup **A1**) and **11 preterm** (30-36 GW, subgroup **A2**). Control group (**B**) consisted of 19 full-term and adequate for gestational age (AGA) newborns. All the partecipants were born in the same hospital and period (2013-2014). Chromosomal disorders, major congenital defects and maternal chronic diseases were criteria of exclusion.
The study population underwent longitudinal evaluation of growth parameters and BM **at 0, 3, 6 and 12 months**. Assessment of BM was performed by ultrasonographyc (US) study of Beclard's nucleus (<3 mm at birth meaning intrauterine delay of BM).

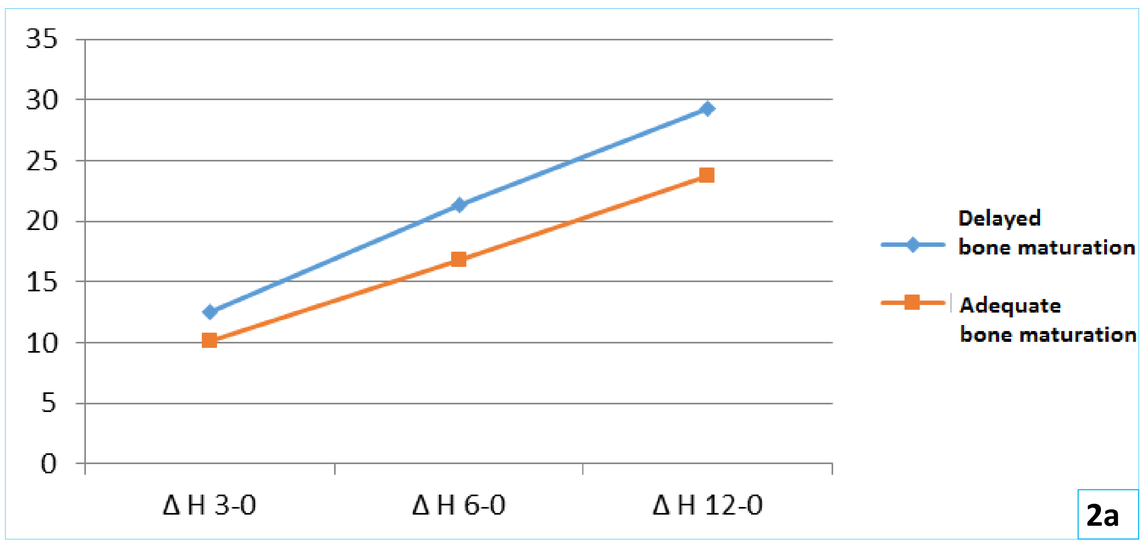
RESULTS

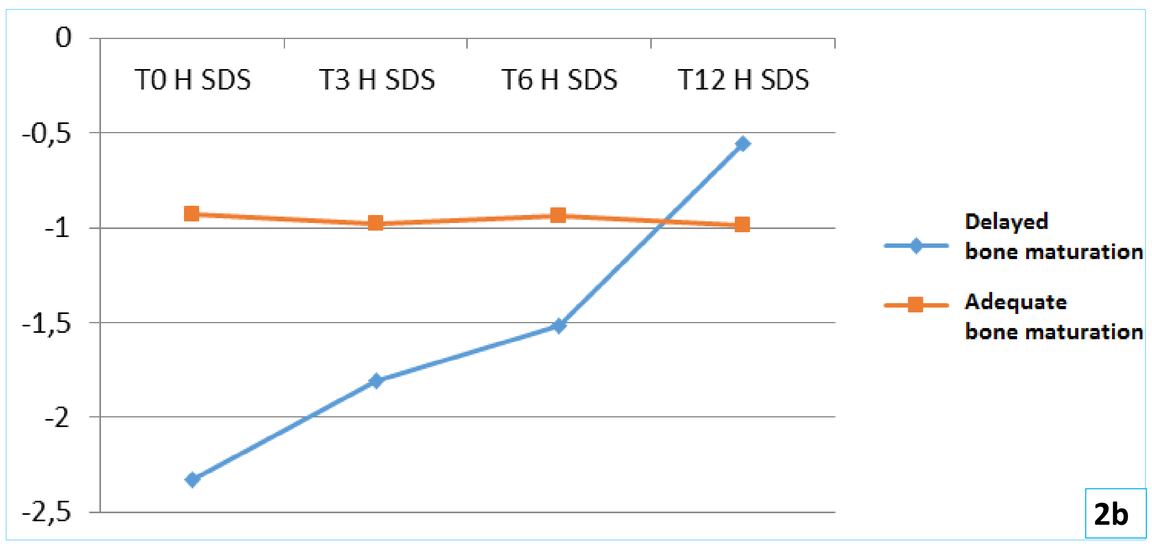
- Mean 1st year height velocity (HV) was 25.5±13.2 cm.
- **Significantly higher HV was observed in subgroup A2 versus A1** (32.4±8.0 vs 25.6±2.9 cm, p=0.01); nevertheless, subgroup A2 presented more frequently <-2 SD height outcome at 1 year than subgroup A1 (27.3% vs 0%, p=0.01).
- If compared with controls, HV was overall higher in SGA group, but without reaching statistical significance (28.6±6.5 vs 25.5±2.9 cm, p=0.10).
- **Intrauterine delay of BM was more common in group A vs B** (59.4% vs 21.2%, p=0.0078), **and in subgroup A2 vs A1** (90.9% vs 42.9%, p=0.0086). SGA with intrauterine delay of BM showed a constant pattern of catch-up growth, **with higher HV and better height gain** (29.75±3.1 vs 23.8±2.7 cm, p=0.003) at 12 months evaluation.





Height velocity (**figure 1a**) and height outcome (**figure 1b**) for each group during 12 months growth evaluation.





Height velocity (**figure 2a**) and height outcome (**figure 2b**) in SGA infants with delayed bone maturation (blue) and adequate bone maturation (orange) during 12-months evaluation.

CONCLUSION

- Our results suggest for the first time that neonatal BM should be regarded as a **predictive factor** of SGA height gain during the first year of life.
- US evaluation of Beclard's nucleus is a useful non–invasive technique to identify intrauterine delay of BM, which can positively influence early postnatal catch-up growth of SGA infants.