SKELETAL MATURITY AND GROWTH IN CHILDREN WITH TYPE 1 DIABETES MELLITUS

Authors- Lohiya N, Khadilkar A, Khadilkar V

HCJMRI & Jehangir Hospital Pune, Pune Maharshtra, India

INTRODUCTION

- Type 1 diabetes (T1DM) being a chronic disease, likely to affect growth of children(1).
- Bone age helps in assessing the growth of child in relation to their skeletal maturity.
- Skeletal maturity is known to be delayed in chronic systemic illness (2).

OBJECTIVES

- To study growth in relation to bone age and chronological age in children with T1DM.

METHODOLOGY

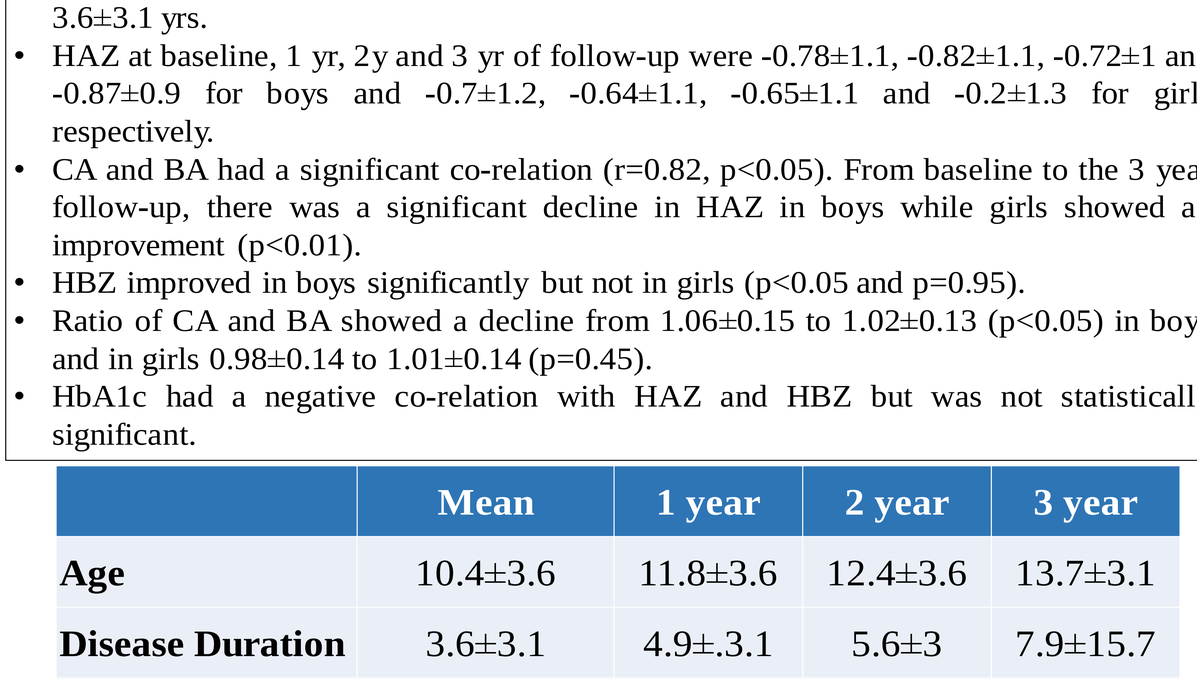
- Study design: Prospective observational study
- Study setting- Tertiary care pediatric endocrine unit
- Study population- Children with T1DM
- Inclusion criteria- Children with T1DM with disease duration of more than 1 year
- Exclusion Criteria- Children with associated illness like hypothyroidism, celiac disease, APS.
- Regular detailed care of type 1 diabetes on yearly basis is carried out including clinical history, anthropometry, bone age (by TW3 method) and HbA1c.
- Screening for complications were also done as per unit protocol.
- National references were used to calculate Height Z score for chronological age (HAZ) and height Z score for bone age (HBZ).
- Bone age (BA) was calculated using Tanner-Whitehouse-3 method
- Chronological age (CA), bone age (BA), height age (HA) and disease duration were noted.
- Ratios of CA, HA and BA was assessed to find any delay or advancement in skeletal maturity Index
- All data were recorded and analysis was performed with SPSS 25.0

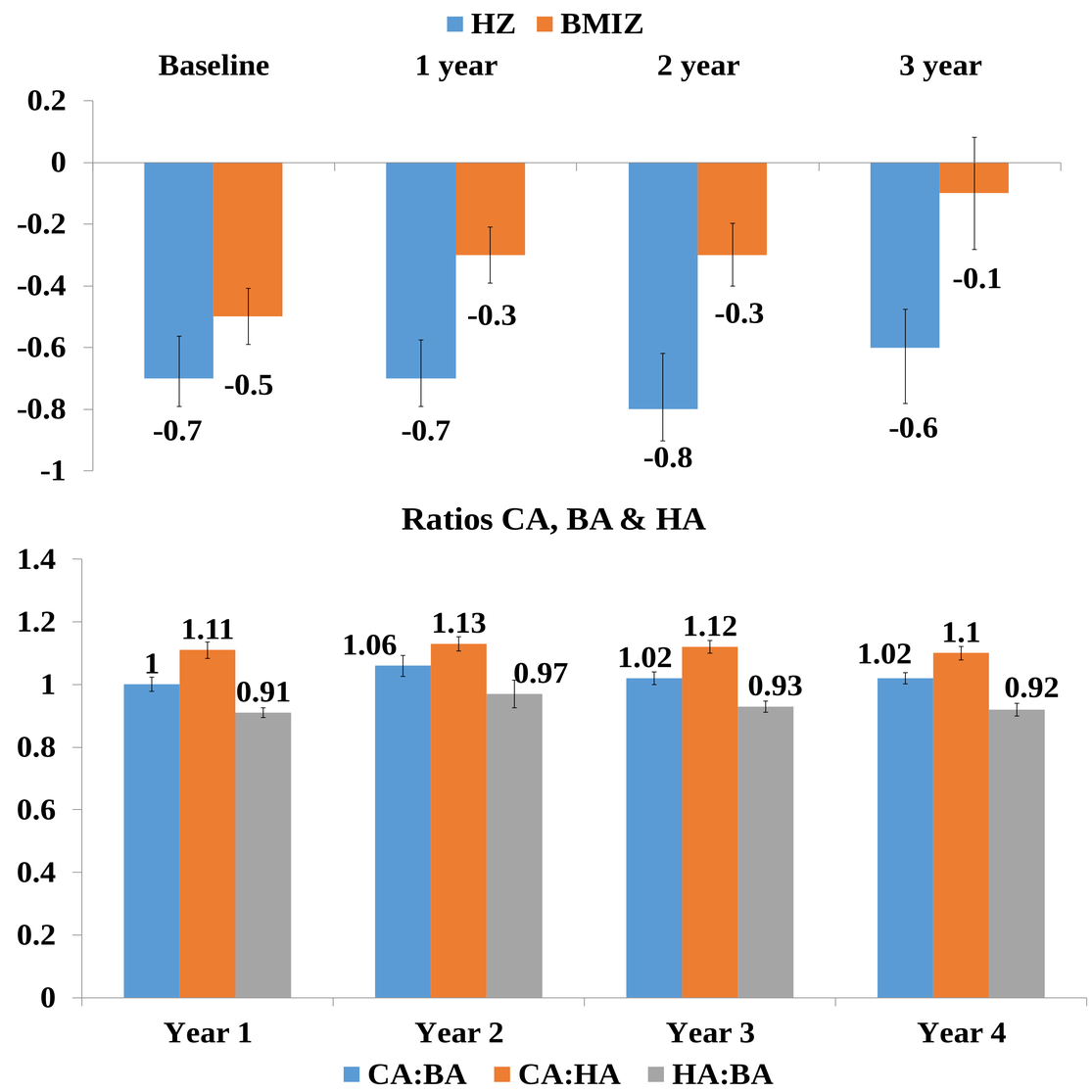
RESULTS

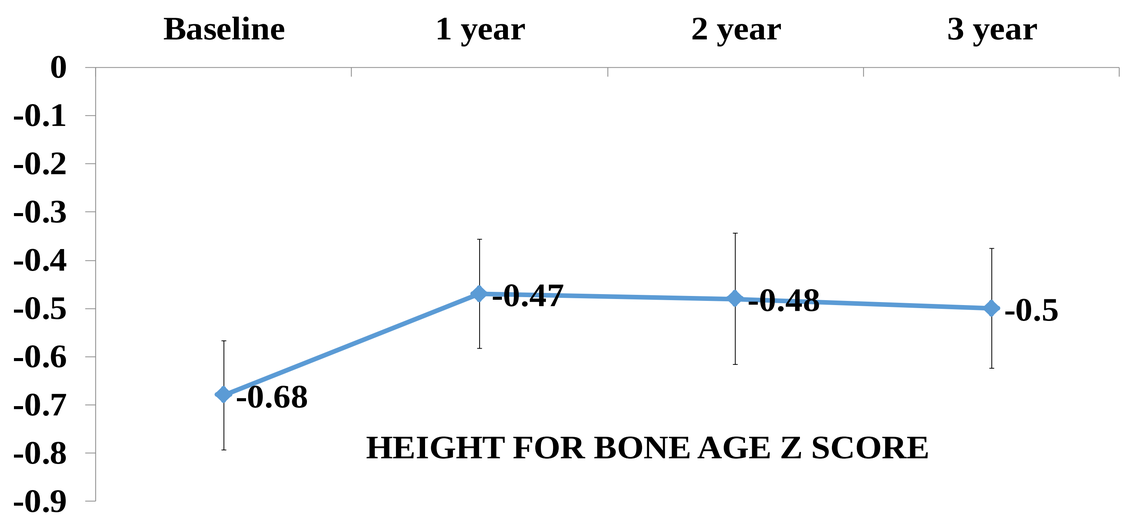
- A total of 78 (42 boy and 36 girls) children were included in the study.
- The mean age at baseline was 10.3±3.6 yrs & mean disease duration at baseline of 3.6±3.1 yrs.
- HAZ at baseline, 1 yr, 2y and 3 yr of follow-up were -0.78±1.1, -0.82±1.1, -0.72±1 and -0.87±0.9 for boys and -0.7±1.2, -0.64±1.1, -0.65±1.1 and -0.2±1.3 for girls respectively.
- CA and BA had a significant co-relation ($r=0.82$, $p<0.05$). From baseline to the 3 year follow-up, there was a significant decline in HAZ in boys while girls showed an improvement ($p<0.01$).
- HBZ improved in boys significantly but not in girls ($p<0.05$ and $p=0.95$).
- Ratio of CA and BA showed a decline from 1.06±0.15 to 1.02±0.13 ($p<0.05$) in boys and in girls 0.98±0.14 to 1.01±0.14 ($p=0.45$).
- HbA1c had a negative co-relation with HAZ and HBZ but was not statistically significant.

	Mean	1 year	2 year	3 year
Age	10.4±3.6	11.8±3.6	12.4±3.6	13.7±3.1
Disease Duration	3.6±3.1	4.9±.3.1	5.6±3	7.9±15.7
Height	133.6±18.9	139.7±18.1	142.6±17.1	143±16.1
BMI	16.1±2.3	17±2.7	17.3±2.9	19.6±3.1
HbA1c	11.3±2.1	10.7±1.9	10.1±2.3	9.8±2.1

TABLE1. LONGITUDINAL AUXOLOGY OF CHILDREN WITH T1DM







DISCUSSION

- We present follow-up data on skeletal maturity rating and auxology in children with T1DM
- Bone age corresponds with chronological age as reported in other studies (3)
- The advancement in BA is delayed as compared to CA which is significant in boys as compared to girls.
- With age, height for Bone age improves in boys which indicates- probable delay in pubertal growth in these children.
- Higher HbA1c negatively impacts anthropometric parameters, is shown in previous studies too (4).
- High HbA1c reflecting poor control potentially impairs bone development.
- Improvement in glycemic control probably helps in optimizing growth.

CONCLUSION

- Children with diabetes were short in comparison with reference growth data.
- In boys the advancement in bone age was significantly slower compared as to the chronological age.
- It is vital to monitor growth in relation to skeletal maturity in children with diabetes.

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Email ID- drnnlohiya@gmail.com

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Nikhil Lohiya

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