

Spinal and forearm bone mineralization in adolescents with Klinefelter syndrome.



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Introduction & Aims

- ✓ Patients with Klinefelter syndrome (KS) are at increased risk for osteoporosis and fractures in adulthood (Bojesen et al., 2011).
- ✓ Data on bone mineralization during childhood and adolescence are limited, although it is a risk period for vitamin D deficiency, low calcium intake and evolving hypogonadism. (Akslaede et al., 2008).
- ✓ A positive influence of vitamin D, but not of testosterone replacement on bone mineralization has been observed in young adults (Ferlin et al., 2015; van den Bergh et al., 2001).
- ✓ We therefore studied bone mineralization at different sites in KS adolescents and its relationship with vitamin D and gonadal status. KS adolescents with lower calcium intake, lower vitamin D status and lower gonadal function were expected to be at risk for a deficient bone mineral accumulation.

Patients & Methods

- ✓ Retrospective bone mineral assessments data of 29 (25 pubertal) patients with non-mosaic KS, aged between 10 and 18 years, without vitamin D or testosterone supplementation were retrieved.
- ✓ Areal Spinal BMD was measured by DXA (Hologic QDR 4500A densitometer (Hologic Inc., Bedford, MA, USA) and radial volumetric BMD by pQCT (XCT 2000, Stratec, Phorzheim, Germany)
- ✓ BMD results are expressed in z-scores using the manufacturer generated reference values.
- ✓ Calcium intake was calculated from a simplified food frequency questionnaire using the method of Nordblad M et al., 2016.
- ✓ Results of biochemical analysis within 6 months of BMD assessment were recorded.

Results

	Median or number	Range (min-max) or %
Age (years)	14.8	10.1 - 18.1
Weight (kg)	62.7	28.6 - 127.5
Weight (z-score)	0.8	-1.6 - 3.4
Height (cm)	175.1	135.5 - 190
Height (z-score)	0.8	-1.1 - 2.2
BMI (kg/m ²)	19.9	14.3 - 38.5
BMI (z-score)	0.6	-2.7 - 2.8
BMI z-score > 1.3 (yes/no)	8/21	37
Puberty (T > 1) (yes/no)	24/ 5	85
Testicular volume (ml)	6	2 - 12
Calcium intake < 500mg/day (yes/no)	11/13	45

Table 1 Clinical characteristics of the patients

	Median or numbers	Range (min-max) or %
25 OH vitamin D (µg/L)	18.6	4.6 - 43.8
Vitamin D deficiency (<20 µg/L)(yes/no)	15/14	51
LH (IU/L)	11.4	0.1 - 53
Elevated LH (> 12 IU/L) (yes/no)	15/14	51
FSH (IU/L)	21.3	0.8 - 78
Elevated FSH (>15 IU/L) (yes/no)	19/10	65
Testosterone (µg/L)	2.8	0.12 - 7.55
Decreased (< ref) Testosterone (if G > 2) (yes/no)	2/19	9

Table 2 Hormonal characteristics of the patients

	Median or number	Range (min-max) or %
Spinal BMD (Z score)	-0.83	-1.8 - 1.6
Radial BMD (Z-score)	-0.10	-1.0 - 1.6
Decreased (< -1 SD) spinal BMD (yes/no) (%)	5/24	17
Decreased (< -2 SD) BMD (yes/no)(%)	0	0
Decreased (< -1 SD) radial BMD (yes/no) (%)	4/17	19
Decreased (< -1 SD) spinal BMD (yes/no) (%)	0	0

Table 3 Spinal and radial BMD results

	Rho (correlation factor)	Significance (p-value)
Height (SDS)	0.66	0.002
BMI (SDS)	0.12	0.51
Testosterone (µg/L)	0.15	0.72
25 OH vitamin D (µg/L)	0.21	0.43
Calcium intake (mg/day)	0.42	0.36

Table 4 Correlation analysis results

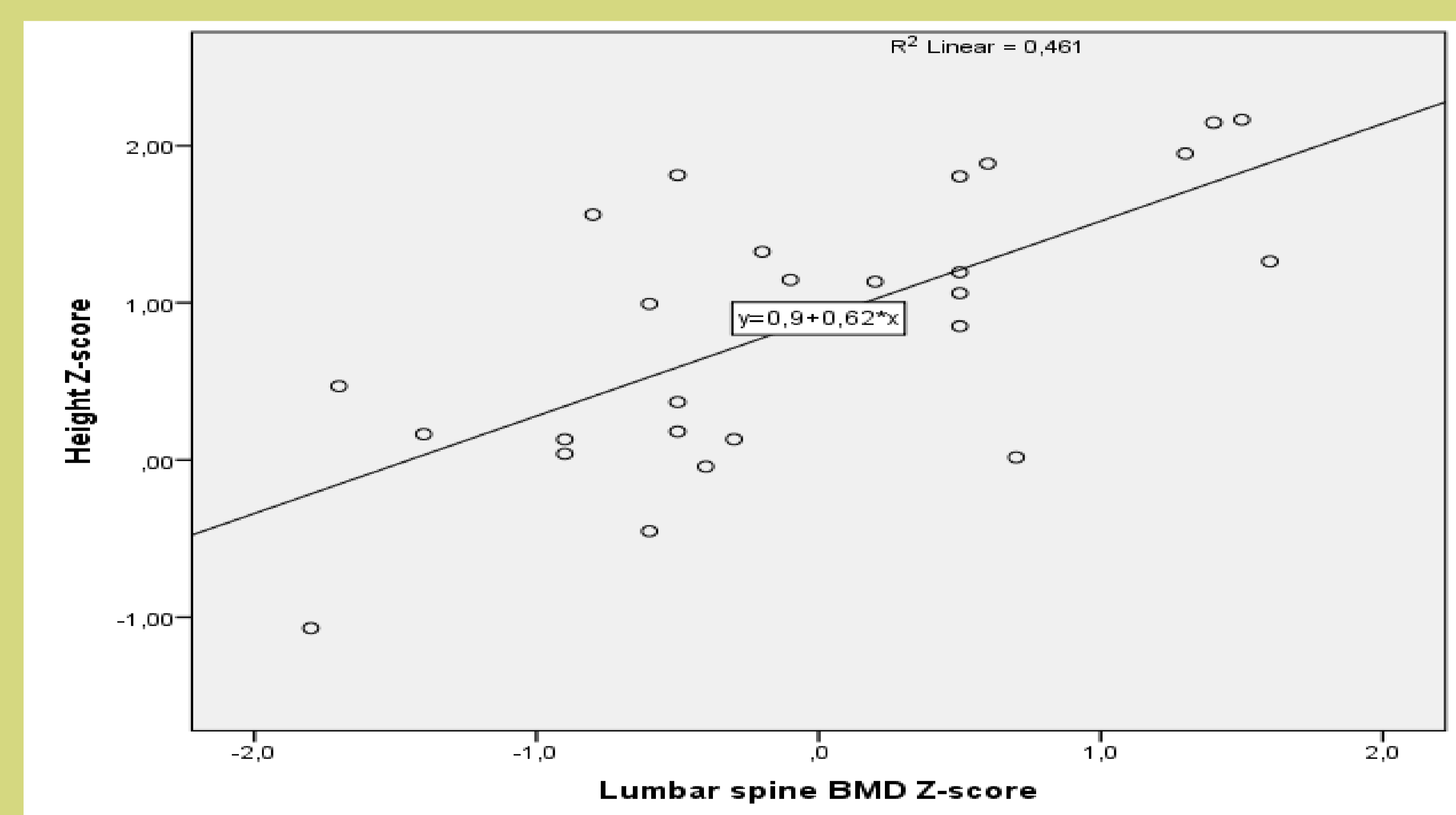


Fig 1 Lumbar spine BMD z-score in relation to standing height

Conclusions

Spinal and radial bone mineralization is normal in KS during adolescence, irrespective of vitamin D status and gonadal status and calcium intake
Spinal BMD results in KS should be interpreted in relation to the height and pubertal status of the patients

No conflict of interest