

Trabecular bone density decreased during 6 year observation in girls with Turner syndrome, but was not associated with fracture history



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Disclosure

None of the authors have any conflict of interest.

Introduction

Increased fracture risk and decreased bone mineral density (BMD) have been demonstrated by several studies in Turner syndrome (TS). Affected females have short stature and present with primary amenorrhea. This study aimed to describe the development of trabecular BMD and cortical thickness with age in adolescent girls with TS and to investigate the potential of these parameters in fracture prediction.

Table 1. Characteristics of patients at the beginning and end of 6-year BMD study.

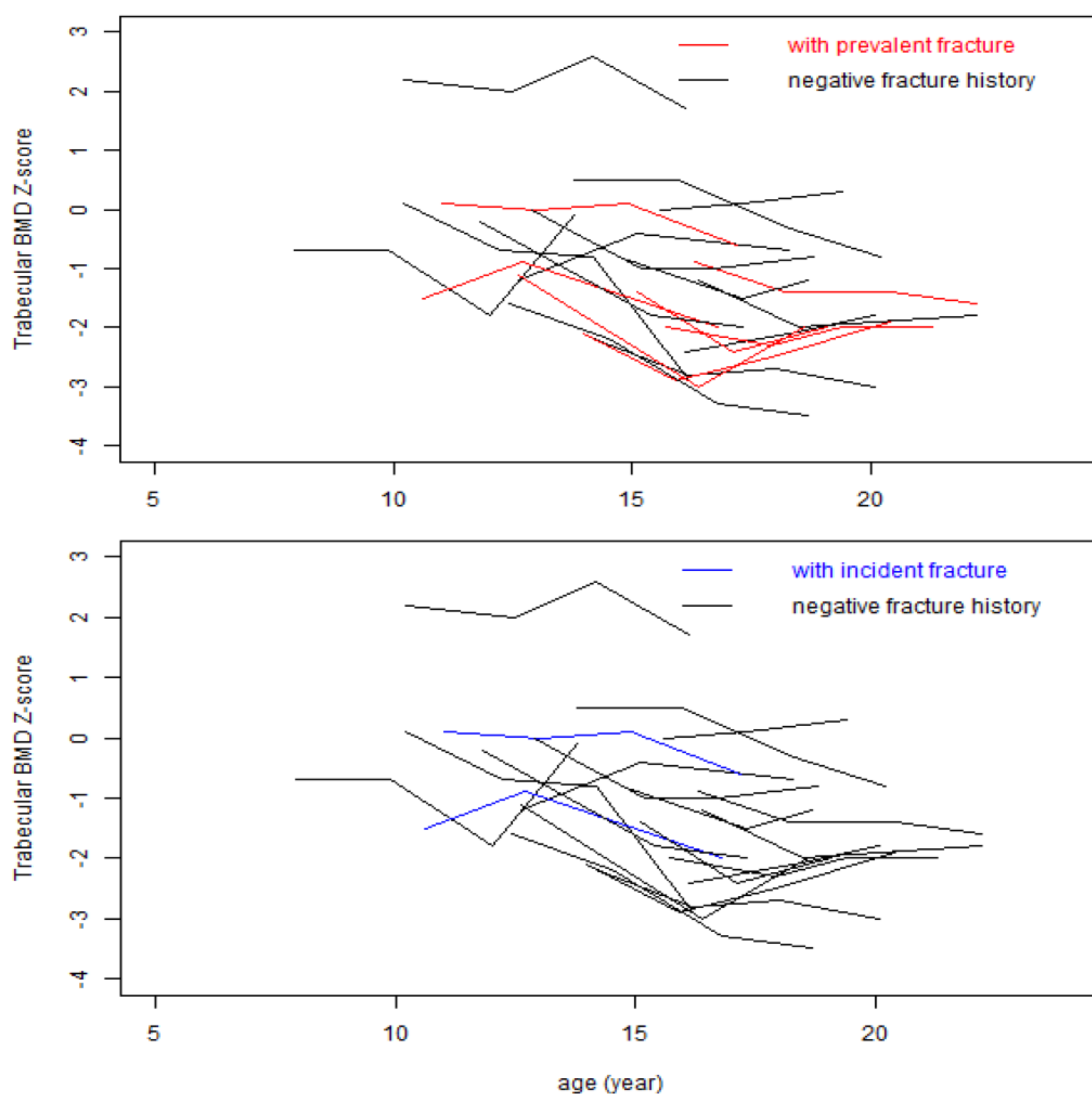
N=32 girls with TS	Study start	Study end
Age (years)	12.1 ±2.8	17.6±2.7
Height (cm)	141.7 ±13.8	156.3±5.1
Height Z-score	-1.6 ±0.7***	-1.5±0.7***
Weight (kg)	41.9 ±13.0	56.1±7.0
Weight Z-score	-0.3 ±0.8*	-0.1±0.6
BMI (kg/m ²)	20.2 ±3.3	22.9±2.5
BMI Z-score	0.6±0.9***	0.8±0.8***
Trabecular BMD Z-score	-0.6±1.0**	-1.3±1.2***
Cortical thickness Z-score	-0.7±1.0***	-0.5±1.0**

Mean±SD. The Z-scores were tested by one-sample T-test. *p<0.05 **p<0.01 ***p<0.001

Methods

Peripheral quantitative CT (pQCT) scans at the forearm were performed in 32 girls with TS at study inclusion and 2, 4 and 6 years thereafter. Trabecular volumetric BMD (vBMD) and cortical thickness were assessed at the 4 and 65% site, respectively. Z-scores were calculated based on published references. The 6-year changes of both parameters were investigated with regard to an interview based fracture history. All TS girls were treated with recombinant human growth hormone. Oral estrogen substitution was given to 26 participants, while the remaining 6 had spontaneous puberty.

Figure 1. Trabecular vBMD development in individual girls with TS over the 6 year period.



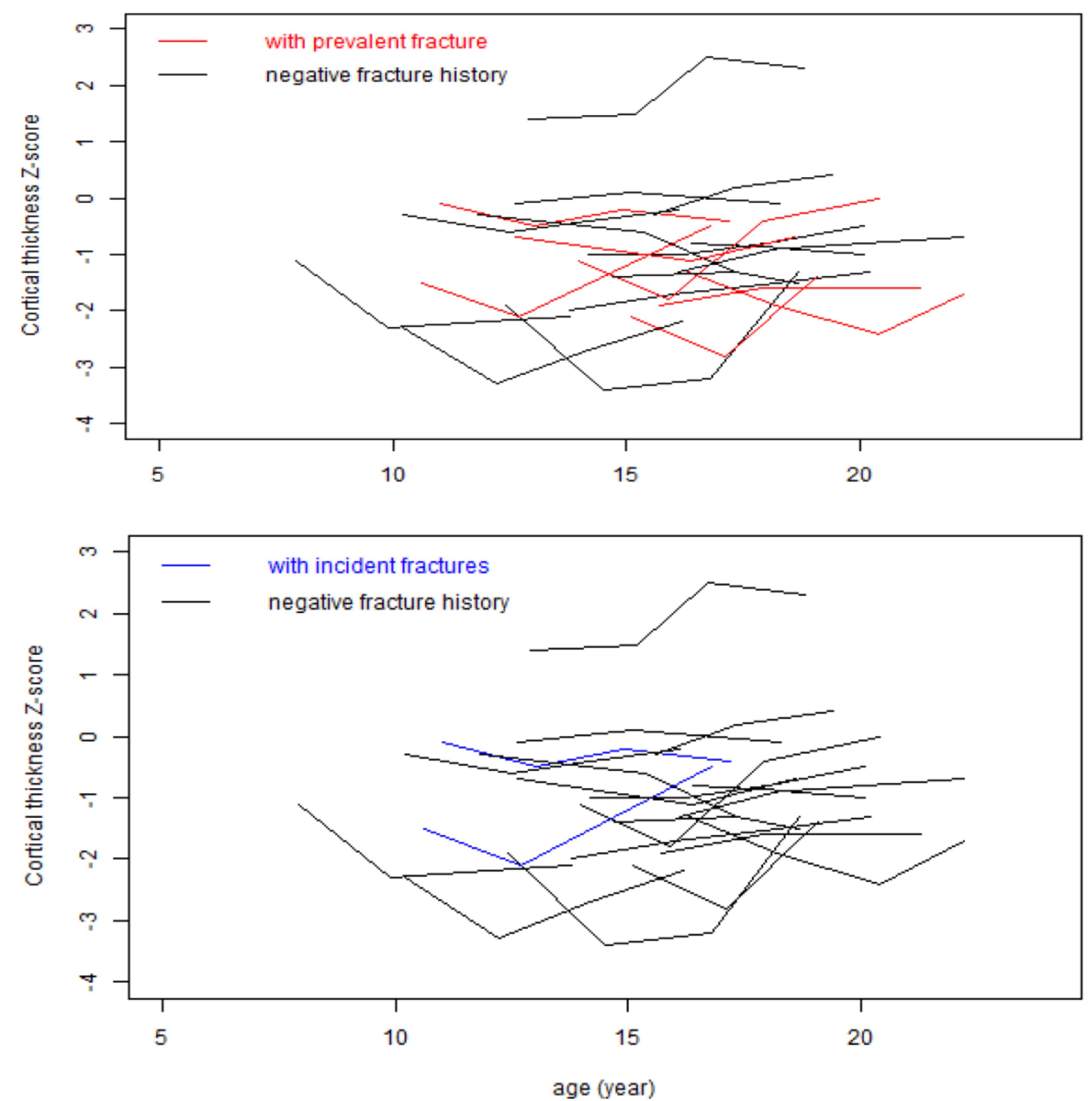
Values of girls with spontaneous puberty are not drawn. Figure was created in R.

Results

Nine girls had positive fracture history at the time of first pQCT assessment, while 3 girls have sustained a fracture during follow up. Mean 6-year decrease in trabecular vBMD Z-score was 1.0±1.2 (p<0.001). No association was found with the age of the first pQCT assessment (95% CI of beta estimate: -0.19; 0.17) and no difference was seen in 6-year change in trabecular vBMD between girls with and without positive fracture history (Z score decreased by 0.73±0.81 and 1.1±1.2, respectively; p=0.42) and between girls with and without incident fractures (-0.35±0.37 and -1.1±1.2; p=0.051).

Cortical thickness Z-score did not change significantly over the 6-year period (-0.31±0.94, p=0.09). The fractured TS girls did not show different cortical thickness development over 6 years of observation compared with the non-fractured TS girls (Z-score decreased by 0.30±0.52 and 0.31±1.1, respectively; p=0.97).

Figure 2. Cortical thickness development over the 6 year period.



Values of girls with spontaneous puberty are not drawn. Figure was created in R

Conclusions

This longitudinal vBMD study in TS girls demonstrates that trabecular vBMD decreases with age, which may be due to the hypogonadism. This was observed despite of the widely accepted oral oestrogen substitution.

Nor trabecular vBMD neither cortical thickness seem to be suitable for fracture prediction in TS. Other bone parameters and bone strength indices need to be explored.

