**Abstract**

Summary

Areal bone mineral density (aBMD) predicts future fracture risk. This study explores the development of aBMD and associated factors in Norwegian adolescents. Our results indicate a high degree of tracking of aBMD levels in adolescence. Anthropometric measures and lifestyle factors were associated with deviation from tracking.

Purpose

Norway has one of the highest reported incidences of hip fractures. Maximization of peak bone mass may reduce future fracture risk. The main aims of this study were to: describe changes in bone mineral levels over 2 years in Norwegian adolescents aged 15-17 years at baseline; to examine the degree of tracking of aBMD during this period and identify baseline predictors associated with positive deviation from tracking.

Methods

In 2010-2011 all first year upper secondary school students in Tromsø were invited to the Fit Futures study and 1038 adolescents (93%) attended. We measured femoral neck (FN), total hip (TH) and total body (TB) aBMD as g/cm² by DXA. Two years later, in 2012-2013, we invited all participants to a follow-up survey, providing 688 repeated measures of aBMD.

Results

aBMD increased significantly (p<0.05) at all skeletal sites in both sexes. Mean annual percentage increase for FN, TH and TB was 0.3, 0.5, 0.8 in girls and 1.5, 1.0 and 2.0 in boys, respectively (p<0.05). There was a high degree of tracking of aBMD levels over two years. In girls, several lifestyle factors predicted a positive deviation from tracking, whereas anthropometric measures appeared influential in boys. Baseline z-score was associated with lower odds of upwards drift in both sexes.

Conclusions

Our results support previous findings on aBMD development in adolescence and indicate strong tracking over two years of follow-up. Baseline anthropometry and lifestyle factors appeared to alter tracking, but not consistently across sex and skeletal sites.

Keywords: Bone Mass, Bone development, Tracking, Adolescence, Areal bone mineral density, DXA.