Evidence for an Association Between Seasonal Fluctuation of 25(OH)D and Serum C-telopeptide: Preliminary Evidence from the D-FINES study

A.L. Darling1, F. Gossiel2, R. Hannon2, D.J. Skene1, J.L. Berry3, R. Eastell1 and S.A. Lanham-New1
1Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK 2Vitamin D Research Group, University of Manchester, Manchester, UK 3Department of Human Metabolism, University of Sheffield, Sheffield, UK

INTRODUCTION

• Individuals receiving moderate levels of sun exposure show a clear seasonal variation in 25(OH)D with highest levels in the summer and lowest levels in the winter.
• There is however a debate as to whether this 25(OH)D seasonal fluctuation or ‘cycling’ is detrimental to health outcomes.
• For example, Vieth (2004) suggests that increased risk of some cancers with high 25(OH)D could be due to slow adaption of the 25(OH)D-1-hydroxylase and the 25(OH)D-24-hydroxylase enzymes in prostate cells to fluctuating 25(OH)D levels.
• This begs the question however as to whether seasonal cycling of 25(OH)D could be detrimental to other organs, for example in bone cells.
• The purpose of this study was to assess whether there is a difference in bone resorption by degree of seasonal change in 25(OH)D and whether this varies by ethnicity.

METHODS

• In the recent D-FINES study, (Vitamin D, Food Intake, Nutrition and Exposure to Sunlight in Southern England, 2006-2007), a subset of 65 subjects from the 293 participants in D-FINES (South Asian (n 30) and Caucasian (n 35)) had blood taken in four seasons for determination of 25(OH)D and serum c-telopeptide (sCTX).
• sCTX was measured using an electrochemiluminescent immunoassay (Roche cobas e411 automated analyser).
• Seasonal fluctuation of 25(OH)D was assessed by calculating the difference between the winter (nadir) and summer (peak) 25(OH)D and for ease of interpretation all changes are expressed as positive values.
• This enabled investigation of the absolute change in 25(OH)D but not its direction. This variable was then split into quartiles within ethnicity. The dependent variables were absolute concentration of sCTX in each season as well as summer to winter change in sCTX.

RESULTS

• ANCOVA was run with absolute summer and winter 25(OH)D status, age, BMI, socioeconomic status, physical activity, and dietary calcium as covariates.
• In the Asian group there was no clear trend between degree of seasonal fluctuation and absolute sCTX.
• Indeed, for absolute sCTX, only the autumn data was statistically significant (F=5.93; p= 0.01).
• No data were significant for change in sCTX fluctuation and absolute sCTX.
• These data suggest lower bone resorption in all seasons in Caucasians with increased cycling, and a reduction in sCTX between summer and winter in both ethnic groups in the middle quartile relative to the other quartiles.
• As the values were covariate adjusted, these trends are not likely to be due to other variables.
• However, it must be borne in mind that these results are only demonstrating trends, which is likely to be due to the small numbers of subjects.
• Further research is required to analyse the large number of banked urine samples from the D-FINES study (n 293) which would enable us to see if these results are statistically significant with increased statistical power.

DISCUSSION

• These data suggest lower bone resorption in all seasons in Caucasians with increased cycling, and a reduction in sCTX between summer and winter in both ethnic groups in the middle quartile relative to the other quartiles.

Figure 1 Serum CTX by quartile of seasonal fluctuation, ethnicity and season

The D-FINES study was funded by the UK Food Standards Agency (N05064). The views expressed are those of the authors alone.

REFERENCES


Vitamin D, Food Intake, Nutrition and Exposure to Sunlight in Southern England