

# Effect of combined B-vitamin supplementation on bone mineral density in adults: a 2-year randomised controlled trial

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## Introduction

- Osteoporosis, a musculoskeletal condition characterised by low bone mineral density (BMD) and deterioration of bone microarchitecture, affects over 200 million people worldwide, with significant adverse health and economic impacts<sup>1</sup>.
- Large cohort studies report strong positive associations between homocysteine (Hcy) concentrations and risk of osteoporotic fracture and/or low BMD<sup>2-3</sup>, with an estimated 4% increased risk of fracture for every 1µmol/L increase in Hcy. Likewise, a higher risk of hip fracture was reported in Norwegian women with lower (< 2.9 nmol/L) compared to higher (> 6.6 nmol/L) serum folate concentrations<sup>3</sup>.
- Other evidence links low vitamin B12 status with poorer bone health, with data from the Framingham Osteoporosis Study showing that plasma B12 concentrations < 148pmol/L were associated with significantly lower BMD<sup>4</sup>.
- There is also some, albeit limited, observational evidence showing associations of dietary intakes or status of vitamin B6 and riboflavin with BMD. Therefore B-vitamin supplementation may be beneficial in maintaining BMD, but to date no previous randomised trial has investigated the effect of all four vitamins in this context.

## Aim

- To investigate the effect of low-dose B-vitamin supplementation for 2 years on BMD in adults

## Methods

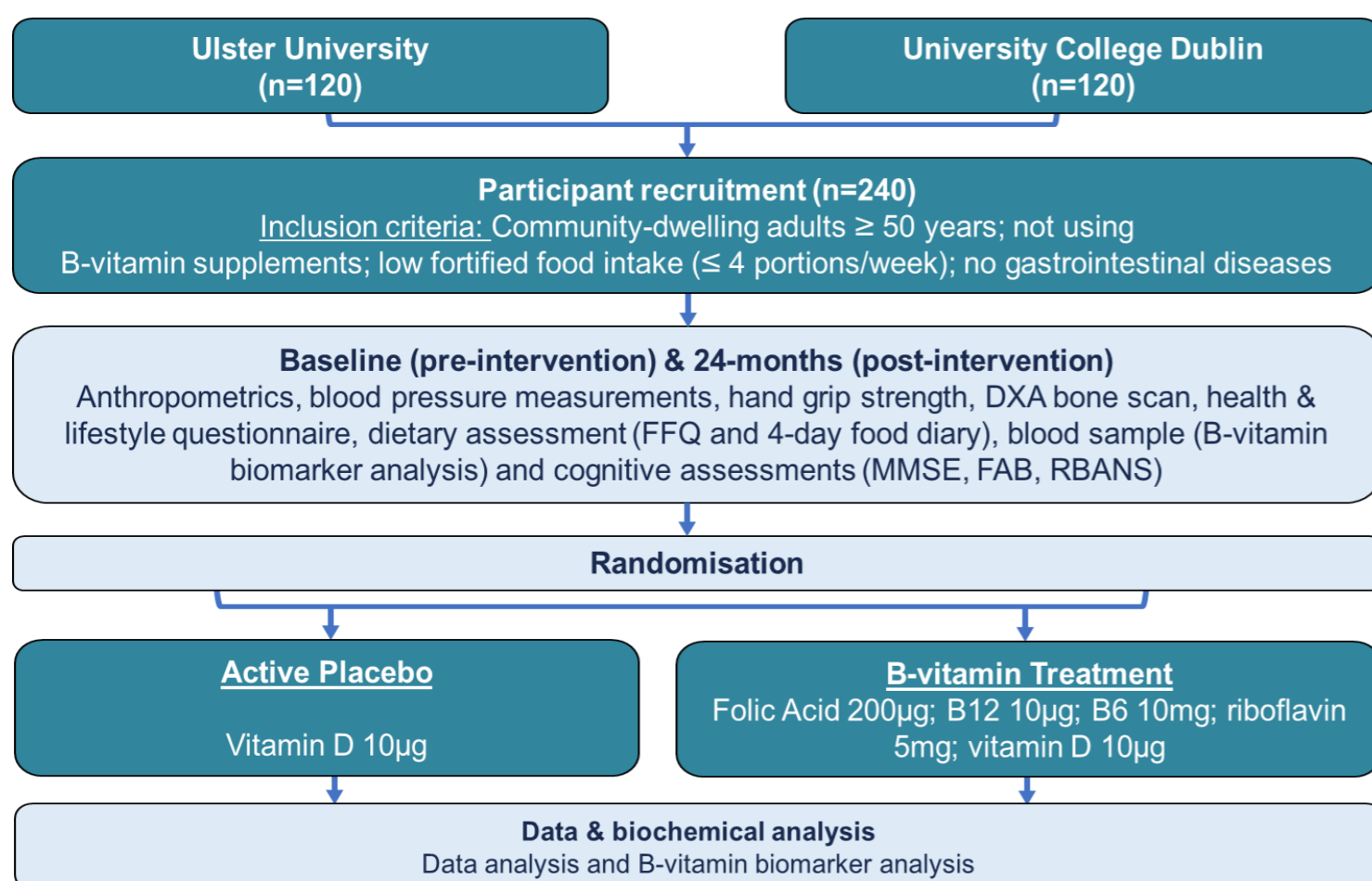


Figure 1. OptiAge RCT Study Design

## Results Summary

- B-vitamin supplementation for 2 years had no overall effect on BMD (Table 1), which declined in both groups by approximately 1% (ranging from -0.7% to -1.4%).
- In participants with lower baseline vitamin B12 status, B-vitamin supplementation decreased the extent of decline in BMD at the total hip (Figure 2a) and femoral neck (Figure 2b) over the 2-year period vs placebo.

## Results

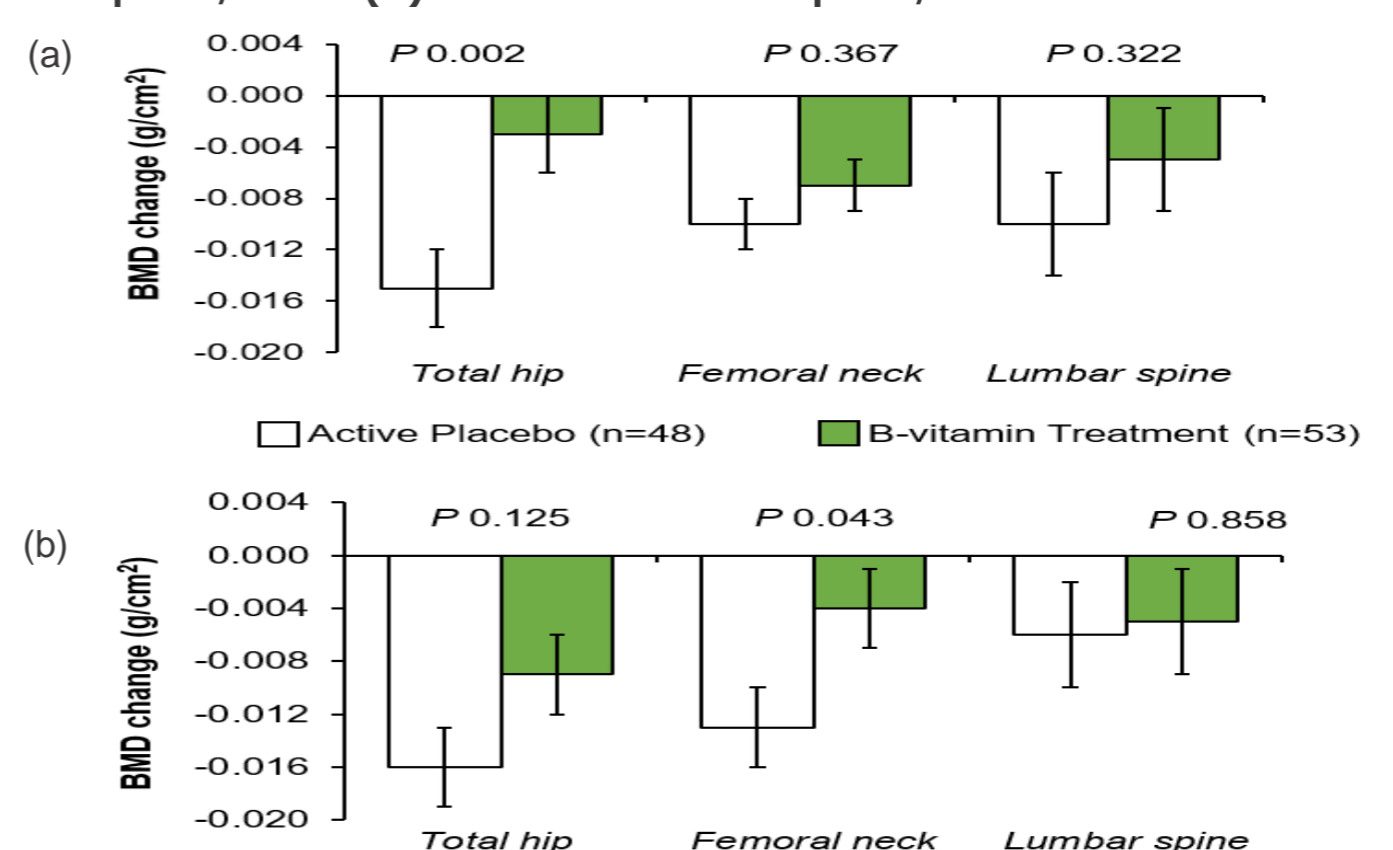
Table 1. BMD response to B-vitamins for 2 years

	Active Placebo (n=102)	B-vitamin Treatment (n=103)	P value <sup>1</sup>
<b>General</b>			
Age (years)	70.6 (69.1, 72.0)	68.7 (67.3, 70.1)	0.085
BMI (kg/m <sup>2</sup> )	28.6 (27.6, 29.6)	28.2 (27.3, 29.1)	0.619
Sex, n (% male)	42 (41)	39 (38)	0.732
<b>BMD (g/cm<sup>2</sup>)</b>			
<b>Total hip</b>			
Pre	0.970 (0.941, 1.000)	0.968 (0.940, 0.996)	
Post	0.962 (0.933, 0.991)	0.957 (0.928, 0.985)	
Change	-0.009 (-0.013, -0.004)	-0.012 (-0.016, -0.007)	0.353
<b>Femoral neck</b>			
Pre	0.891 (0.866, 0.917)	0.903 (0.878, 0.928)	
Post	0.884 (0.859, 0.909)	0.895 (0.870, 0.921)	
Change	-0.008 (-0.013, -0.003)	-0.007 (-0.012, -0.002)	0.938
<b>Lumbar spine</b>			
Pre	1.120 (1.084, 1.156)	1.132 (1.093, 1.171)	
Post	1.111 (1.076, 1.146)	1.117 (1.157, 1.110)	
Change	-0.010 (-0.017, -0.003)	-0.014 (-0.020, -0.007)	0.170

Data shown as mean (95% CI) or %; Change shown as adjusted mean; Analysed on an intention-to-treat basis.

<sup>1</sup>Independent samples t-test or chi-square (general characteristics), BMD change analysed by ANCOVA (adjusted for age, sex, BMI, alcohol intake); P<0.05.

Figure 2. BMD change after 2 years of B-vitamin supplementation in participants with lower baseline vitamin B12 status: (a) serum total B12 < 246pmol/L and (b) serum MMA ≥ 0.22µmol/L



## Conclusions

- Low-dose B-vitamin supplementation for 2 years resulted in significant responses in B-vitamin biomarkers, but there was no overall corresponding effect on BMD within the total cohort.
- Improving B-vitamin status appears to have benefits in maintaining bone health specifically in adults with lower vitamin B12 status. Further studies are warranted to confirm this finding.

## References

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