

Supplementary Material

Table i. Adjusted mean bone mineral density of the lumbar spine (g/cm³) and odds of osteopenia/osteoporosis (lumbar spine) by quartile of serum sex steroid hormones in men aged over 20 years; sensitivity analysis with men with osteoporosis included in the analysis (n = 814 instead of n = 806); National Health and Nutrition Examination Survey 1999-2004¹

Sex steroid hormone	Adjusted mean bone mineral density (95% CI)*	Adjusted odds ratio (95% CI)*
Total E2 (pg/ml)		
1 (< 21.52)	1.066 (1.023 to 1.109)	0.72 (0.25 to 2.08)
2 (21.52 to < 29.42)	1.044 (1.019 to 1.069)	1.01 (0.46 to 2.21)
3 (29.42 to < 39.29)	1.048 (1.024 to 1.072)	0.81 (0.39 to 1.68)
4 (≥ 39.29)	1.032 (1.003 to 1.061)	1.00
p-trend†	0.336	0.728
Free E2 (pg/ml)		
1 (< 0.529)	1.027 (0.986 to 1.068)	2.56 (1.31 to 5.01)
2 (0.529 to < 0.741)	1.038 (1.011 to 1.065)	1.79 (0.96 to 3.33)
3 (0.741 to < 1.003)	1.044 (1.017 to 1.071)	1.59 (0.77 to 3.28)
4 (≥ 1.003)	1.070 (1.046 to 1.094)	1.00
p-trend†	0.049	0.010
Total T (ng/ml)		
1 (< 3.67)	1.050 (1.015 to 1.085)	0.90 (0.38 to 2.09)
2 (3.67 to < 4.93)	1.040 (1.015 to 1.065)	1.19 (0.59 to 2.43)
3 (4.93 to < 6.26)	1.049 (1.018 to 1.080)	0.90 (0.47 to 1.70)
4 (≥ 6.26)	1.049 (1.008 to 1.090)	1.00
p-trend†	0.994	0.986
Free T (ng/ml)		
1 (< 0.068)	1.030 (0.999 to 1.061)	1.62 (0.91 to 2.88)
2 (0.068 to < 0.095)	1.043 (1.016 to 1.070)	1.12 (0.60 to 2.09)
3 (0.095 to < 0.126)	1.059 (1.030 to 1.088)	1.06 (0.59 to 1.89)
4 (≥ 0.126)	1.047 (1.023 to 1.071)	1.00
p-trend†	0.393	0.130
SHBG (nmol/l)		
1 (< 24.05)	1.099 (1.046 to 1.152)	0.78 (0.21 to 2.83)
2 (24.05 to < 33.74)	1.038 (1.009 to 1.067)	1.62 (0.69 to 3.82)
3 (33.74 to < 48.49)	1.029 (1.011 to 1.047)	1.63 (0.71 to 3.71)
4 (≥ 48.49)	1.043 (1.012 to 1.074)	1.00
p-trend†	0.211	0.848
AAG (ng/ml)		
1 (< 5.15)	1.010 (0.969 to 1.051)	2.41 (1.11 to 5.21)
2 (5.15 to < 6.89)	1.037 (1.013 to 1.061)	1.40 (0.68 to 2.87)
3 (6.89 to < 9.61)	1.060 (1.031 to 1.089)	1.21 (0.63 to 2.32)
4 (≥ 9.61)	1.063 (1.036 to 1.090)	1.00
p-trend†	0.035	0.048

*Results were adjusted for race/ethnicity, age, smoking status, alcohol consumption, moderate or vigorous physical activity in the last month, percentage of body fat, waist circumference, current dairy consumption, milk consumption as a child, milk consumption as a teenager, milk consumption as an adult and other hormones, excluding 3 α -androstane diol glucuronide.

†A test for trend using quartiles of hormones and sex hormone binding globulin as an ordinal variable was performed to assess any statistically significant linear trend. Interactions tests were multivariate logistic regression models that included a cross-product term in an unstratified model to assess the presence of interaction between quartiles of each hormone and those characteristics.

AAG, 3 α -androstane diol glucuronide; CI, confidence interval; E2, oestradiol; SHBG, sex hormone binding globulin; T, testosterone.

Reference

1. **No authors listed.** National Health and Nutrition Examination Survey (NHANES) 1999-2000. <https://www.cdc.gov/nchs/nhanes/ContinuousNhanes/Default.aspx?BeginYear=1999> (date last accessed 19 February 2020).