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Determinants of serum 25-hydroxyvitamin D concentrations in a nationally representative sample of Irish adults

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Serum 25-hydroxyvitamin D (s25(OH)D) concentration should be used to assess vitamin D status as it reflects combined dietary supply and dermal production⁽¹⁾. Low vitamin D status in Irish adults is common⁽²⁾. Knowledge of the key determinants of s25(OH)D within a population can inform the development of strategies for improving vitamin D status.

The objective of this study was to investigate determinants of s25(OH)D concentrations in 1132 adults aged 18+ yrs (men *n* 569; women *n* 563) who participated in the National Adult Nutrition Survey in Ireland (www.iuna.net). Data from the survey on dietary intakes, anthropometric data, socio-demographic and lifestyle characteristics were used together with data on fasting s25(OH)D measured by ELISA.

Mean, median and the minimum to maximum range of s25(OH)D within the cohort was 60.0, 57.2, and 19.4–202.5 nmol/L, respectively. A multiple linear regression analysis model showed that 31.7% of the variability in s25(OH)D concentrations was explained by the variables selected (see Table). The following variables were significant within the model: season of blood sampling, sun exposure habits, frequency of sunscreen use, use of vitamin D-containing supplements, vitamin D intake (food sources only), smoking status, waist circumference and age.

Explanatory variables	B	β	P -value	95% CI for B
<i>Season of blood sampling: Winter vs. spring</i>	0.014	0.034	0.311	−0.013, 0.040
Winter vs. summer	0.184	0.443	<0.001	0.157, 0.211
Winter vs. autumn	0.127	0.346	<0.001	0.101, 0.152
<i>Sun Habits: Avoids sun vs. sometimes in sun</i>	0.020	0.057	0.098	−0.004, 0.043
Avoids sun vs. prefers sun	0.083	0.218	<0.001	0.057, 0.109
<i>Frequency of sunscreen use: Never vs. rarely</i>	0.017	0.037	0.393	−0.022, 0.057
Never vs. sometimes	0.034	0.099	0.060	−0.001, 0.069
Never vs. always	0.044	0.109	0.023	0.006, 0.082
Not using a vitamin D supplement	−0.075	−0.167	<0.001	−0.104, −0.047
Vitamin D intake (μg/d) ¹	0.093	0.159	<0.001	0.059, 0.127
Not using a calcium supplement	−0.027	−0.054	0.095	−0.059, 0.005
Calcium intake (mg/d) ¹	−0.023	−0.023	0.448	−0.082, 0.036
Age (yr)	0.001	0.063	0.049	0.00, 0.001
Gender: being a woman vs. a man	−0.020	−0.059	0.062	−0.041, 0.001
Waist circumference (cm) ¹	−0.253	−0.095	0.002	−0.416, −0.091
<i>Smoking status: Smoker vs. ex-smoker</i>	0.059	0.151	<0.001	0.032, 0.086
Smoker vs. non-smoker	0.066	0.191	<0.001	0.042, 0.090

B: Unstandardized Coefficient; β: Standardized Coefficient; CI: Confidence interval. ¹Logarithmically transformed.

Sun exposure, vitamin D intake (i.e., diet and supplemental supply separately) and increasing age were significant positive determinants of s25(OH)D concentrations in the Irish adult population, while smoking, abdominal obesity were negative determinants. These determinants of s25(OH)D were similar across age-categories (18–35, 36–50, 51–64, 65+ yr), however, in adults aged 65+ yr, the most significant determinant of s25(OH)D was the use of calcium-containing supplements.

In conclusion, as current public health policies caution against increasing sun exposure in the context of skin cancer risk, this places a greater emphasis on food-based strategies for improving vitamin D status.

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1. Seamans & Cashman (2009) *Am J Clin Nutr.* **89**(6): 1997S–2008S.
2. Hill T, Flynn A, Kiely M, Cashman KD (2006) *Ir Med J.* **99**(2): 48–49.