

Associations of vitamin D intake and vitamin D serum levels with reproductive parameters in young men from Southern Spain

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BACKGROUND

We have previously reported that semen quality has declined drastically in recent decades. The role of vitamin D on the male reproductive system is still controversial. Several studies showed that low serum vitamin D has been associated with low sperm motility, lower sperm count and low serum testosterone levels.

OBJECTIVE

To assess the association between vitamin D [25(OH)D₂₊₃] serum levels and dietary intake of vitamin D with semen quality and reproductive hormones levels in healthy young men from Southern Spain.

MATERIALS AND METHODS

Cross-sectional study of 204 male university students (18-23 years old) recruited between 2010 and 2011 in Murcia Region (Spain).

All men provided samples for routine semen analysis and blood for measurements of reproductive hormones and total vitamin D. Diet was assessed using a validated food frequency questionnaire.

Table 1. Characteristics of participants in the Murcia Young Men's Study of vitamin D (N=204)

	Median (5 th -95 th percentile) or n (%)
Age (years)	20.4 (18.1-22.8)
BMI (kg/m ²)	23.6 (19.3-29.7)
Current smoker, n (%)	62 (30.7)
Prolonged disease ^a , n (%)	29 (14.2)
Take any medication ^b , n (%)	44 (21.6)
Andrological exam	
Mean testis size (ml)	21.0 (15.0-26.0)
Presence of varicocele, n (%)	31 (15.2)
Cryptorchidism, n (%)	4 (2.5)
Semen evaluation	
Ejaculation abstinence time (h)	71.0 (39.0-137)
Seminal volume (mL)	3.0 (1.0-6.6)
Sperm concentration (million/mL)	43.4 (8.6-131)
% Motile sperm (PR+NP) ^c	57.1 (39.0-74.0)
% Morphologically normal sperm	9.0 (2.2-23.0)
Serum concentrations	
Total 25(OH)D (nmol/l)	69.3 (41.2-102)
Calcium (mmol/l)	2.5 (2.4-2.6)
FSH (IU/L)	2.2 (0.93-5.4)
LH (IU/L)	4.0 (1.9-7.1)
Inhibin b (pg/mL)	191 (101-336)
Testosterone (T) (nmol/L)	21.1 (11.4-33.7)
Sex hormone binding globulin (nmol/L)	29.0 (16.0-54.8)
Calculated free T (pmol/L)	608 (332-979)
Estradiol (E ₂) (pmol/L)	76.0 (48.0-118)
FT/LH ratio	3.4 (1.6-7.3)
T/E ₂ ratio	0.28 (0.17-0.43)
T/LH ratio	5.2 (2.6-10.9)

^aLong-lasting disease (including diabetes/thyroid disease), sexually transmitted diseases (diagnosed with epididymitis, chlamydia or gonorrhoea).

^bTaken any medication during 3 months prior to participation in study (mostly antibiotics or medication against allergy).

^cPercentage of motile sperm [progressive + non-progressive (PR+NP)].

Semen sample	Blood sample	FFQ
<ul style="list-style-type: none"> • semen volume • sperm count • sperm motility • sperm morphology 	<ul style="list-style-type: none"> • 25(OH)D₂₊₃ • testosterone (T) • follicle-stimulating hormone (FSH) • luteinizing hormone (LH) • inhibin B • estradiol (E₂) 	<ul style="list-style-type: none"> • Vitamin D dietary intake

Serum total 25(OH)D results were categorized into insufficiency (<50 nmol), sufficiency (50-75 nmol/l), and higher vitamin D status (>75 nmol/l). Relationships between total 25(OH)D categories and semen quality parameters were examined using linear regression, adjusting for BMI, season, age, current smoking status and technical covariates (e.g., abstinence time).

RESULTS

Vitamin D status was in normal range or higher (>50 nmol/l) in most of the men (82%). Only 2 men (1%) had vitamin D deficiency (<25 nmol/l) and 18% were vitamin D insufficient (<50 nmol/l).

Mean (SD) daily dietary intake of vitamin D was 4.28µg (2.92) while Recommended Daily Allowance for men is 15µg.

Mean values (SD) of semen quality and reproductive hormones levels are shown in Table 1.

We did not observe any associations between total 25(OH)D serum levels and any semen parameters or reproductive hormones levels (all p > 0.15) in crude or adjusted models.

CONCLUSIONS

Among young men with normal semen parameters and predominantly sufficient serum 25(OH)D, there was no evidence for an association. It remains to be determined whether low semen quality may be improved by increasing 25(OH)D status. Further investigations are needed in order to confirm and expand these findings.

