

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

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INTRODUCTION

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.

To the best of our knowledge, there are no studies exploring associations between dietary intake and serum vitamin D levels and reproductive parameters in young unselected Mediterranean men. Therefore, the aim of this study was to assess associations between vitamin D status (dietary intake and blood serum levels) and semen quality and serum reproductive hormone levels in young men.

METHODOLOGY

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.

Serum total 25(OH)D results were categorized into insufficiency (<50 nmol/l), 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.

Semen sample	Blood sample	FFQ
*semen volume *sperm count *sperm motility *sperm morphology	*25(OH)D ₂₊₃ *T *FSH *LH *inhibin B *E ₂	*Vitamin D dietary intake

RESULTS

Vitamin D status was in normal range or higher (>50 nmol/l) in most of the men (82%). Only 3 men (1,5%) had vitamin D deficiency (<30 nmol/l) and 18% were vitamin D insufficient (<50 nmol/l). Mean (SD) daily dietary intake of vitamin D was 4.28µg (2.92), so 172.2 IU (116.8) while Recommended Daily Allowance for men is 15µg, so 600 IU.

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.

Variables (median and 5th-95th percentile)	25(OH)D ₂₊₃ concentration (nmol/l)			Total (n=204)	p-values ^a
	<50 (n=36)	50-75 (n=95)	>75 (n=73)		
Age (years)	21.2 (18.3-22.6)	20.6 (18.5-23.0)	19.7 (18.2-22.8)	20.4 (18.1-22.8)	0.002
BMI (kg/m ²)	24.8 (20.0-31.5)	23.7 (19.5-29.9)	23.1 (19.0-28.4)	23.6 (19.3-29.7)	0.09
Mean Testis size (ml)	21.0 (14.2-27.1)	21.0 (14.5-26.0)	21.0 (16.0-26.0)	21.0 (15.0-26.0)	0.84
Total sperm count (Mill.)	122 (18.2-423)	134 (11.6-365)	94.9 (21.2-441)	119 (17.2-403)	0.91
% Motile sperm (PR+NP)	60.3 (36.9-76.8)	56.3 (37-73.5)	56.7 (39.0-74.8)	57.1 (39.0-74.0)	0.08
% Morphologically normal sperm	9.5 (1.9-22.7)	9.0 (2.0-24.8)	9.0 (3.0-23.0)	9.0 (2.2-23.0)	0.68
FSH (IU/L)	2.7 (0.67-7.3)	2.1 (0.9-5.0)	2.3 (0.9-6.1)	2.2 (0.93-5.4)	0.046
Inhibin b (pg/mL)	168 (98.5-279)	185 (97.2-311)	200 (107-379)	191 (101-336)	0.025
LH (IU/L)	3.8 (2.2-6.8)	4.3 (2.1-7.4)	3.9 (1.7-6.9)	4.0 (1.9-7.1)	0.53
Testosterone (nmol/L)	21.3 (11.2-35.7)	20.6 (10.5-33.0)	21.2 (11.9-34.7)	21.1 (11.4-33.7)	0.92
SHBG (nmol/L)	27.0 (17.7-63.2)	30.0 (15.8-54.2)	30.0 (16.4-52.9)	29.0 (16.0-54.8)	0.57
Calculated FT (pmol/L)	473 (286-886)	479 (241-843)	485 (277-775)	482 (276-845)	0.24
Estradiol (E ₂) (pmol/L)	76.5 (49.4-120)	75.0 (41.8-117)	77.0 (51.0-129)	76.0 (48.0-118)	0.53

DISCUSSION

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.

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