

Effect of Vitamin D Status on Weight Loss and Biochemical Changes in a Clinic Setting



Abboud M, Fayet F, Brock KE, Mason RS



College of Natural and Health Sciences, Zayed University, Dubai, UAE

Department of Physiology and the Bosch Institute, University of Sydney.

Discipline of Behavioural and Social Sciences in Health, University of Sydney.



BOSCH
INSTITUTE



Vitamin D synthesis and metabolism

7 dehydrocholesterol

← Skin – UV

Vitamin D ← Diet – not much
liver

25(OH)D*

kidney
and
other
tissues

1, 25(OH)₂D = calcitriol

1,25(OH)₂D is synthesized
in many tissues. This is why
25OHD availability is so important
Different regulators in other tissues

regulated

Not well regulated

↑ By PTH (low Ca²⁺)

low PO₄³⁻
growth
pregnancy

renal
regulation

* Major circulating metabolite
measured to determine vitamin D status

Hypotheses



- ❖ On a standard weight loss regimen, an adequate baseline vitamin D status ($>50\text{nmol/L}$) predicts a greater percentage of body weight loss and abdominal circumference reduction at 3 months
- ❖ Vitamin D repletion of those who were insufficient at baseline ($<50\text{nmol/L}$), through short-term daily vitamin D supplementation of 4000IU enhances weight loss and biochemical markers.

Methods

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Retrospective
Data analysis

Primary Care Physician

Blood tests

Dietitian

Serum 25(OH)D
Lipids (TC, LDL&HDL, TG)

Anthropometry
ht, wt, wc

BASELINE

**With or without vitamin D
supplementation for 3 months**

Serum 25(OH)D
Lipids (TC, LDL&HDL, TG)

Anthropometry
ht, wt, wc

FOLLOW UP

Records of 212 healthy men and premenopausal women
between the ages of 18 and 50 were coded for analysis

Methods

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Exclusion Criteria

- History of diabetes mellitus, PCOS, parathyroid disorder, kidney or liver disease
- Use of any medications known to affect body weight (such as steroids)
- Use of calcium supplements, use of >400 IU of ergocalciferol or cholecalciferol, or any dose of activated vitamin D at the baseline consultation
- Pregnancy, osteopenia or osteoporosis

Subjects' baseline and follow up characteristics

		6 Baseline	Follow up	
Parameters	n	Mean±SD	Mean±SD	p value
Weight, Kg	212	88.8±18.5	83.1±17.7	<0.001
BMI, Kg/m ²	212			<0.001
Waist circumference, cm	212			<0.001
25(OH)D, mmol/l	212			<0.001
BP Systolic, mm Hg	212	126.5±14.7	123.1±11.4	<0.001
BP Diastolic, mm Hg	212	77.9±10.4	78.1±8.5	<0.001
Total Cholesterol, mmol/l	211			
HDL, mmol/l	209			
LDL, mmol/l	209			
Triglycerides, mmol/l	211			

Baseline parameters grouped by vitamin D status and vitamin D supplementation

	Sufficient at baseline			Deficient at baseline		
Baseline	Total (n=89)	Non- Supplemented (n=82)	Supplemented (n=7)	Total (n=123)	Non- Supplemented (n=48)	Supplemented (n=75)
Weight	90±17	89±17	97±22	88±19	88±17	87±20
BMI	31±5	31±5	32±5	31±5	31±4	31±6
Waist	97±14	100±15	97±14	98±14	98±15	98±15
BP-Sys	128±15	126±14	141±19*	126±15	127±13	125±16
BP-Dia	78±10	77±10	83±10	78±11	78±10	78±11
TC	5.9±0.6	5.9±0.6	5.4±0.5	5.5±1.1	5.5±1.2	5.5±1.0
LDL	3.2±0.8	3.2±0.8	3.3±0.4	3.2±1.0	3.1±1.0	3.2±1.0
HDL	1.5±0.4	1.5±0.4	1.4±0.4	1.5±0.4	1.5±0.4	1.5±0.5
TG	1.4±0.9	1.4±0.9	1.7±0.9	1.7±1.2	1.8±1.4	1.6±1.1

Follow up Serum 25(OH)D

		Sufficient at baseline		Deficient at baseline	
Baseline parameters	Total (n=89)			Total (n=123)	
Baseline 25(OH)D	64±11			33±10‡	
Follow-up 25(OH) D	64±14			49±18‡	

p value non-supp vs. supp *p<0.05
 p value sufficient vs. deficient ‡<0.001

Changes in 25(OH)D, wt, BMI, wc, lipids and BP with or without 3-month supplementation with vitamin D

	Sufficient at baseline			Deficient at baseline		
Change (Δ) in parameters	Total	Non-Supplemented	Supplemented	Total	Non-Supplemented	Supplemented
Δ 25(OH)D	0.02 \pm 9			16 \pm 17 \ddagger		
		-7.7 \pm 5.9	-8.9 \pm 3.1			
		-2.6 \pm 1.8	-2.9 \pm 0.9			
Δ BP sys	-5.4 \pm 10	-4.8 \pm 9.2	-10.6 \pm 16	-2.2 \pm 11	-3.1 \pm 8.4	-1.6 \pm 12
Δ BP dia	-0.24 \pm 11	-0.2 \pm 8.6	-1.1 \pm 1.0	-0.4 \pm 0.9	-1.4 \pm 8.2	-0.2 \pm 9.6
Δ TC	-0.9 \pm 5.4	-1.0 \pm 5.6	-0.3 \pm 0.3	-0.3 \pm 0.5	-0.2 \pm 0.5	-0.4 \pm 0.5
Δ LDL	-0.38 \pm 0.3	-0.4 \pm 0.3	-0.4 \pm 0.3	-0.26 \pm 0.5 \ddagger		
Δ HDL	-0.1 \pm 0.2	-0.1 \pm 0.2	-0.05 \pm 0.6	-0.1 \pm 0.2	-0.1 \pm 0.2	-0.1 \pm 0.2
Δ TG	-0.2 \pm 0.4	-0.2 \pm 0.4	-0.4 \pm 0.3	-0.2 \pm 0.9	-0.2 \pm 0.9	-0.2 \pm 0.5

Summary of Findings

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- ◆ Adequate baseline 25(OH)D levels were associated with enhanced weight loss as well as BMI and waist circumference reduction in overweight and obese subjects
- ◆ Vitamin D supplementation in patients with baseline vitamin D deficiency led to 25(OH)D repletion and resulted in significantly more weight loss as well as reduction in BMI and waist circumference, on a standard weight loss program.

Comments and Conclusions

Although this was not a randomized controlled trial, there was no obvious systematic bias detected in relation to which vitamin D-deficient patients received vitamin D supplementation

These results, from “real world” clinics, suggest that vitamin D status should be managed along with lifestyle modifications for optimal weight loss.