Overweight and obesity is associated with low 25-hydroxyvitamin D levels in cutaneous melanoma patients

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BACKGROUND and AIMS

Vitamin D status is influenced by well-known determinants, but factors associated with low 25-hydroxyvitamin D (25OHD) levels in a cutaneous melanoma (CM) population are not well defined. The aim of the study is to confirm the well-known determinants and to assess new determinants for the 25OHD levels, in CM patients.

METHODS

In a prospectively included cohort of 387 patients with CM we assessed the association between 25OHD status (as measured by liquid chromatography tandem mass spectrometry) and the following parameters: gender, age, body mass index (BMI), season of blood draw, Fitzpatrick phototype, VD supplementation, score for intensity of life time sun exposure, smoking, education level, hair and skin color, eye color, total number of benign naevi, solar lentigines, freckles, guttate hypomelanosis and actinic keratosis. In addition 25OHD levels were correlated with pathological parameters of the primary tumor and melanoma stage (8th edition of AJCC).

The probabilities of 25OHD levels of <20 ng/mL vs 25(OH)D ≥ 20 ng/mL were modeled by multivariate logistic regression analysis (reference category = 'normal' status). Odds ratios (ORs) and 95% confidence interval were computed. All statistical tests were two sided, and $p < 0.05$ was considered significant. All analyses were performed with R software.

RESULTS (1)

Higher BMI (≥ 25-30 kg/m² or > 30 kg/m²) was associated with higher risk of 25OHD levels < 20 ng/mL compared to CM patients with normal BMI (≥ 18.5-25 kg/m²) (OR = 2.23, 95% CI = 1.32 – 3.81 and OR = 5.80, 95% CI = 2.99 – 11,6, respectively). Patients whose serum was taken in wintertime for baseline 25OHD serum levels had a significant higher risk of lower 25OHD levels compared to patients whose serum was taken in summertime (OR = 2.74, 95% CI = 1.44 – 5.38). CM patients taking no VD supplementation had a higher risk of low 25OHD levels compared to patients taking supplements (OR = 8.69, 95% CI = 3.53 – 26.4). Patients with light skin and blond or light brown hair had higher chances of normal 25OHD levels compared to patients with light skin and brown or black hair (OR = 0.48, 95% CI = 0.28 – 0.83). Other parameters were not selected in the multi variable model (Table 1).

Univariate analysis demonstrated a statistically significant association between higher tumor stage and lower VD levels (Table 2).

Table 1: Associations between 25OHD status and clinical parameters, the final multivariable model including the selected parameters (N = 387).

Characteristics	25(OH)D <20 ng/mL vs 25(OH)D ≥ 20 ng/mL			
	OR[1]	95% CI[2]	p-value	p-global
VD supplementation				<0.001
Supplementation (ref)	-	-		
No supplementation	8.69	3.53, 26.4	<0.001	
Body mass index (kg/m²)				<0.001
< 18.5	0.69	0.03, 5.23	0.753	
≥18.5-<25 (ref)	-	-		
≥25-<30	2.23	1.32, 3.81	0.003	
≥30	5.80	2.99, 11.6	<0.001	
Season of blood draw				0.022
Winter (dec - february)	2.74	1.44, 5.38	0.003	
Spring (march - may)	1.94	0.97, 3.93	0.063	
Summer (june - august) (ref)	-	-		
Autumn (sept - nov)	1.73	0.85, 3.58	0.134	
Hair color + skin color				0.012
light skin, red or red-blond hair	1.37	0.56, 3.42	0.492	
light skin, blond or light brown hair	0.48	0.28, 0.83	0.008	
light skin, brown or black hair (ref)	-	-	-	
medium tone skin, brown or black hair or brown skin, dark brown or black hair or black skin, dark brown or black hair	0.54	0.24, 1.17	0.121	

Table 2: . Associations between 25OHD status and CM stage, univariable analysis.

Characteristics	25(OH)D <20 ng/mL vs 25(OH)D ≥ 20 ng/mL				
	n	OR[1]	95% CI[2]	p-value	p-global
pT staging	385	1.11	1.00 – 1.24	0.048	0.047
N staging	387	1.15	0.98 – 1.35	0.094	0.091
pTNM staging	385	1.14	1.01 – 1.29	0.029	0.029

[1] OR = Odds ratio on 25OHD levels < 20 ng/mL, [2]CI = Confidence interval, ref = reference

CONCLUSION

We found a significant effect of the BMI, seasonal time of blood sampling, use of VD supplements and having light skin with blond/light brown hair on the 25OHD levels in CM patients.

Current trials investigating the benefit of VD supplementation in patients with CM must take overweight and obesitas into account.

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