P2-P150

Prevalence of Vitamin D Deficiency in Haitian Infants and Young Children.

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INTRODUCTION

Background: Vitamin D deficiency in children is a common cause of rickets, and a potential risk factor for extraskeletal adverse health outcomes. Its prevalence in Haiti has not been previously assessed.

Objective and hypotheses: To examine the prevalence of vitamin D deficiency in dark-skinned young children in Haiti.

DESIGN / METHODS

Design: Cross-sectional study, Mar - Jun 2015

Setting: Community churches in 3 different geographical regions in Haiti (Artibonite, Ouest and Centre).

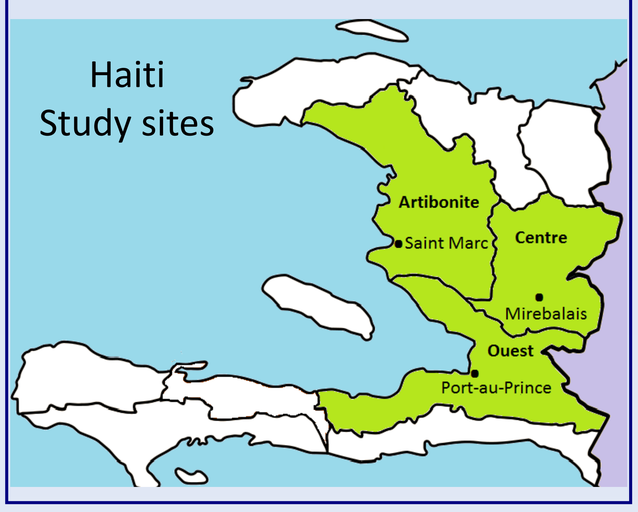
Participants: 292 healthy Haitian infants and children aged 9 months to 6 years, with 1/3 enrolled in each region

Main Outcome Measures: Vitamin D insufficiency, deficiency and severe deficiency, defined as 25-OH-vitamin-D levels (25OHD) <30, <20 and <10 ng/mL, respectively.

Data Collection Methods: We obtained anthropometrics, information on family income, breast feeding and diet history. We measured serum 25OHD levels, and, in vitamin D deficient children, alkaline phosphatase levels.

Statistical Methods: We used standard descriptive statistics; ANOVA and Kruskall-Wallis for group comparisons; Bonferroni correction for multiple testing; linear and logistic regression to assess for predictors of 25-OHD levels and vitamin D insufficiency, deficiency and severe deficiency, respectively.

Study registration: clinicaltrials.gov, Clinical Trials Registration Number: NCT02301520.



RESULTS

292 subjects (mean age 3.3±1.6 years, 50.3% females, median family income USD 30/week) participated, 100 in C, 94 in U, and 98 in M. Moderate-severe malnutrition was present in 16.4%, and more common in M (25.5%) vs. C (11%) and U (12.8%), p=0.01. Mean 25OHD was 30.7±9.2 ng/mL. Prevalence of vitamin D insufficiency, deficiency and severe deficiency was 43.2%, 8.6% and 0%, respectively. Deficiency was highest in C (21%) vs. U and M (both 2%, p <0.0001). No subject had elevated alkaline phosphatase levels.

In univariate analyses, higher weight and height z-scores, shorter breast feeding duration and less sun exposure were predictive of lower 25OHD, whereas diet, skin darkness, and income were not. In a multivariate model, region C and weight z-score remained significant predictors of lower 25OHD. In univariate and multivariate logistic models, only region was a significant predictor of vitamin D deficiency.

RESULTS

Table 1: Subject Characteristics

Variable	All subjects N=292	Artibonite N=100	Ouest N=94	Centre N=98	p-value
N (%) Female	145 (50)	52 (52)	47 (50)	46 (47)	0.77
Age [years]	3.4 ± 1.6	3.1 ± 1.5	3.5 ± 1.5	3.5 ± 1.7	0.12
Family Income [USD/week]	30 (20, 50)	30 (20, 50)	30 (20, 50)	30 (17, 50)	0.48
N(%) malnutrition[1]	48 (16)	11 (11)	12 (13)	25 (26)*	**0.01**
N(%) wasting[2]	22 / 281 (8)	10 / 95 (11)	4 / 91 (4)	8/95 (8)	0.29
N(%) stunting[3]	42 / 290 (15)	7 / 100 (7)	8 / 92 (9)	27 / 98 (28)*	**<.0001**
Sun score[4]	9 (8,9)	8 (7,9)	8.5 (7,9)	9 (9,9)	**<0.0001**
Skin score[5]	28.1 ± 2.6	27.8 ± 2.5	27.8 ±2.7	28.6 ± 2.4	0.07
Breastfeeding					
Never	10 (3.6)	7 (7.3)	2 (2.3)	1 (1)	
Birth - <6mo	26 (9.4)	15 (15.6)	6 (6.7)	5 (5.2)	
Birth - 6-12mo	75 (26.7)	26 (27.1)	34 (38.2)	15 (15.6)	**0.0003**
Birth - >12mo	146 (52.0)	42 (43.8)	41 (46.1)	63 (65.6)	
Currently	24 (8.5)	6 (6.3)	6 (6.7)	12 (12.5)	

[1]weight-for-age <2 standard deviation score (SDS)
[2]weight-for-height <2 SDS;
[3]height-for-age <2 SDS;
*p<0.02 (Bonferroni corrected p-value for comparison with coastal and urban regions)

[4]Sun score

Going out of doors during day time	Yes=1; No=0
Time spent outdoors	10-15min=0; 15-30min=1; 30=60min=2; >60min=3
Skin exposure	Face only=0; face, hands=1; face, hands, arms=2; face, hands, arms, legs=3
Wearing sun screen	Yes=0; No=1
Travel to Southern location	Yes=1; No=0
TOTAL SCORE	**Maximum: 9**

[5]Skin score

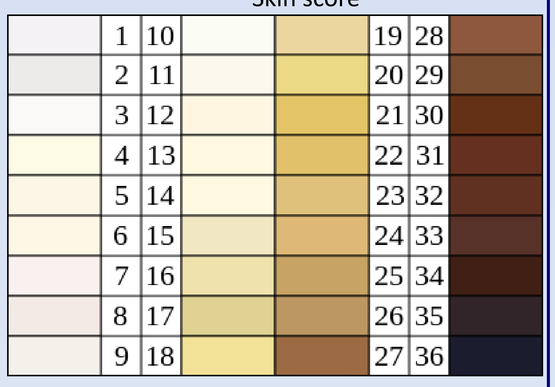


Table 2: Vitamin D and Alkaline Phosphatase Levels

Variable	All subjects N=292	Artibonite N=100	Ouest N=94	Centre N=98	p-value
25OHD level (ng/ml)	30.7 ± 9.2	24.3 ± 6.4	31.8 ± 6.5	36.2 ± 9.9	**<0.0001**
N (%) Vit D insufficiency	126 (43.2)	66 (66)	36 (38.3)	24 (24.5)	**<0.0001**
N (%) Vit D deficiency	25 (8.6)	21 (21)	2 (2.1)	2 (2)	**<0.0001**
N (%) severe VitD deficiency	0	0	0	0	--
Alkaline Phosphatase (U/L)	190 (167, 252) N=52	215 (178, 272) N=24	181 (139,232) N=12	192 (144, 256) N=16	0.07

RESULTS

Table 3: Multivariate linear model of predictors of 25OHD levels

Variable	Coefficient	Standard Error	p-value
Intercept	17.94	6.10	0.003
Age	0.07	0.36	0.84
Weight-for-age Z-score	-1.06	0.53	**<0.05**
Height-for-age Z-score	0.23	0.46	0.62
Urban vs. Coastal region*	8.02	1.29	**<.0001**
Mountainous vs. Coastal region*	10.34	1.32	**<.0001**
Family Income	-0.0005	0.0003	0.11
Time spent outside	-0.86	1.21	0.48
Sun Score	0.99	0.99	0.32
Breastfeeding duration	0.21	0.59	0.73

Table 4: Multivariate logistic model of predictors of vitamin D deficiency

Variable	Log Odds Ratio	Standard Error	P-value
Intercept	-4.37	5.07	0.39
Age	0.09	0.21	0.65
Weight-for-age Z-score	0.09	0.29	0.75
Height-for-age Z-score	-0.16	0.25	0.52
Urban vs. Coastal region*	-2.15	0.80	**0.007**
Mountainous vs. Coastal region*	-2.35	0.82	**0.004**
Family Income	-0.0001	0.0002	0.54
Time spent outside	-0.43	0.77	0.57
Sun Score	0.47	0.72	0.51
Breastfeeding duration	0.01	0.11	0.91

*Coastal Region is coded as the reference region

CONCLUSIONS

While the prevalence of vitamin D deficiency in young children in Haiti is <10%, close to half have sub-optimal vitamin D levels. Public health recommendations such as increased sun exposure, fortified food products and/or routine vitamin D supplementation should be considered. Reasons for higher deficiency rates in coastal areas need further exploration.

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