

25-Hydroxyvitamin D as a discriminator of death or survival in U.S. adults: NHANES III

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Introduction

- Vitamin D deficiency is common in US adults and has been associated with adverse health outcomes.
- The utility of screening for abnormal 25-hydroxyvitamin D [(OH) D] levels is unknown.
- Ideally, the threshold value chosen to define normal/abnormal would be a good discriminator of death or survival: “normals” would have high survival rates and “abnormals” would have high mortality rates.
- Expressed differently, the threshold value would have a combination of high specificity, high sensitivity and a high C-statistic in binary logistic models with death or survival as outcome.

Methods

- NHANES III was a probability sample of the non-institutionalized US civilian population (1988-1994). Adults aged ≥ 20 were included and (OH) D levels were measured in all subjects. As classic cardiovascular risk factors were also under consideration, subjects with fasting blood tests were chosen (n = 6,165).

Methods (cont)

- The DiaSorin RIA assay (Stillwater, MN) was used to measure 25(OH)D levels.
- Vital status was ascertained through December 31, 2000. C-statistics for mortality were calculated from logistic regression models. To identify (OH) D levels maximally discriminating between survival and death, C-statistics were computed separately for whole-number thresholds between 5 and 50 ng/mL. As the discriminatory power of many variables might reflect correlations with other variables, most notably age, we constructed classification trees for death/survival that considered age and classic risk factors.
- NHANES-recommended weights were used to generate national parameter estimates.

Results

- The characteristics of US adults (1988-1994) are shown in Table 1.
- Mean (OH) D levels were 29.8 ng/mL.
- Table 2 shows odds ratios and C-statistics for death or survival. While low (OH) D levels were associated with mortality, (OH) D was a poor discriminator of death or survival when treated as a continuous variable, with a C-statistic barely higher than a statistical toss-up (0.51).
- When each whole number threshold between 5 and 50 was examined, (OH) D was a poor discriminator of death/survival with a maximum C-statistic of 0.51 for a threshold of 40 ng/mL.
- With Classification and Regression Tree analysis considering age and classic cardiovascular risk factors, (OH) D was not a principal discriminator of death or survival in either the overall population or the major subgroups identified.

Table 1. US Adult Population

	(1988-1994)
(OH) D, ng/mL	29.8 (SE 0.32)
Age	44.88 (0.57)
Female, %	53.24 (0.92)
Race, %	
White	78.26 (1.42)
African American	9.38 (0.59)
Hispanic	5.00 (0.44)
Other	7.36 (1.05)
Hypertension, %	23.59 (0.88)
Diabetes, %	4.16 (0.34)
CVD, %	5.36 (0.47)
Current smoker, %	27.06 (1.04)
Systolic BP	121.86 (0.46)
Diastolic BP	73.81 (0.24)
BMI	26.58 (0.15)
LDL	127.88 (0.92)
HDL	50.37 (0.42)
Glucose	98.04 (0.82)
GFR	99.36 (0.69)

Table 2. C-statistics and Mortality Odds Ratios.

	C-Statistic	Odds Ratio(95% CI)
Age	0.87	1.10 (1.09, 1.11)
GFR	0.80	0.95 (0.94, 0.95)
Systolic BP	0.74	1.05 (1.05, 1.06)
Log ACR	0.71	1.91 (1.70, 2.14)
Glucose	0.63	1.01 (1.01, 1.01)
LDL	0.55	1.01 (1.01, 1.01)
(OH) D	0.51	0.98 (0.97, 0.99)
Diastolic BP	0.51	1.01 (1.00, 1.03)
HDL	0.49	1.00 (0.99, 1.01)
BMI	0.47	1.01 (0.99, 1.03)

Conclusions

- While low levels are associated with death in US adults, (OH) D is a poor discriminator of death or survival.
- Screening for (OH) D levels in community-dwelling adults may not be an effective public health strategy.