

Evidence Based Critically Appraised Topic
Vitamin D Supplementation and Race/Ethnicity Differences

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Clinical Scenario

A 62 year old female presents to the clinic for her annual physical. Lab reports show a low serum 25-hydroxyvitamin D (25OHD) level at 20 ng/ml. Patient was started on vitamin D supplements Vitamin D 600 IU. This brought a discussion between my preceptor and me, Renee stated she started testing women for Vit. D deficiency a couple years ago and has found 300-400 patients of hers alone so far with a Vit. D deficiency. I asked if she saw a difference between whites and darker skinned people needing different Vit. D supplementation.

Clinical Question

In the white or black adult female patient is vitamin D supplement dose requirements different compared to placebo more effective in increasing serum vitamin D levels.

Articles:

Gallagher, J., Peacock, M., Yalamanchili, V., & Smith, L. (2013). Effects of vitamin D supplementation in older african american woman. *Journal of Clinical Endocrinology & Metabolism* . Advance online publication. doi: 10.1210/jc.2012-3106

Gutierrez, O. M., Farwell, W. R., Kermah, D., Taylor, E. N. (2011). Racial differences in the relationship between vitamin D, bone mineral density, and parathyroid hormone in the national health and nutrition examination survey. *Osteoporos Int.* 22(6), 1745-1753. doi: 10.1007/s00198-010-1383-2

Summary and Appraisal of Key Evidence

Study 1:

Gallagher et al.,(2013) conducted a randomized, double-blind placebo trial to assess vitamin D supplement need similar in black and white woman, at Creighton University Medical Center and Indiana University Medical Center, a Level 1, Grade A level of evidence. The study included 110 healthy older postmenopausal African American women between the age 57 to 90 years, and vitamin D insufficiency with serum 25OHD levels of 20 ng/ml or less.

The intervention consisted of participants randomly assigned to placebo, vitamin D3 400, 800, 1600, 2400, 3200, 4000, or 4800 IU daily; calcium supplements were given to maintain total calcium intake of 1200–1400 mg/d. The objective of the study was to measure the effect of vitamin D3 on serum 25OHD and serum PTH in older African American women with vitamin D insufficiency and the serum 25OHD 20 ng/mL or less (<50 nmol/L). The primary outcome was monitoring serum 25OHD and serum PTH levels at baseline then after 12 months of vitamin D supplementation.

Study 2:

Gutierrez et al., (2011) examined the relationship between 25(OH)D and parathyroid hormone in 8,415 adult participants (25% black & 24% Mexican-American) in the National Health and Nutrition Examination Surveys (NHANES) 2003-2004 & 2005-2006; and between 25(OH)D and bone mineral density in 4,206 adult participants (24% black and 24% Mexican-American) in the 2003-2004 sample. This is a Level 2 Grade A research study.

After selection in a complex survey design, participants were interviewed and examined, blood collected for measurement of biochemistry profile including serum PTH, 25(OH)D, calcium, phosphate, albumin, and creatinine. A dietary interview collected data for estimating the daily intake of nutrients, and queried about the use of supplemental calcium and vitamin D.

Results

The results of the studies indicate that race or ethnicity does not change the dose of vitamin D supplementation requirements between races. However both studies had limitations. The limitations of study 1 included its small sample size and the inclusion of mostly older women. Study 2 limitations, the variability on the performance of 25 (OH)D assays in NHANES 2000-2006 could still have impacted the results. Even after a comparison of the 2003-2004, and 2005-2006 sample remained qualitatively the same. Further research is needed to confirm the findings and to determine whether race and/or ethnic-specific ranges of optimal 25(OH)D are required to appropriately evaluate the adequacy of vitamin D stores in diverse populations.

Clinical Bottom Line

According to the two studies regarding vitamin D supplements, suggest that the recommended daily dose of 800 iu remains the same for white and black women. These studies are relevant to practice today because vitamin D deficiency is becoming more prevalent in the Northern states with less sunlight like North Dakota. Vitamin D deficiency is a precursor to hypertension, diabetes, cancer and skeletal pain/deformities. Blacks and Hispanics consistently manifest lower serum concentrations of 25(OH)D than non-Hispanics whites. Primarily because increased skin pigmentation inhibits cutaneous synthesis of cholecalciferol, the metabolic precursor to 25(OH)D. As a provider we need to know the appropriate dose and requirements for our patients.

Implications for Practice

I would recommend the same recommended daily allowance of vitamin D 800 iu for white and black patients. However I would encourage initial labs of serum 25(OH)D, and current monitoring parameters for assessing vitamin D levels. Although these studies used 25(OH)D thresholds derived from skeletal or mineral endpoints in white populations, further research needed to test whether uniform targets for 25 (OH)D adequacy results in similar or discordant outcomes by race. More research on the topic would be extremely helpful to see if there is racial difference in the requirements of vitamin D supplementation.

References

Gallagher, J., Peacock, M., Yalamanchili, V., & Smith, L. (2013). Vitamin D supplement needs similar in black and white woman. *Journal of Clinical Endocrinology & Metabolism* .

Advance online publication. doi: 10.1210/jc.2012-3106

Gordon, N., Caan, B. J., & Asgari, M. M. (2012). Variation in vitamin D supplementation among adults in multi-race/ethnic health plan population, 2008. *Nutrition Journal*. *11*(104).

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