Impact of Smoking and Nicotine Exposure on Vitamin D Status: Associations with Age, Body Weight, and Supplementation in a U.S. Population

Mani K. Askari[1*], Vaishnavi Aradhyula[2], Hoda Shabpiray[3], Anand Mutgi[4], Sadik Khuder[5], Basil Akpunonu[6], Douglas Federman[7]

[1]Assistant Professor, Internal Medicine Clerkship Program Director, Division of Internal Medicine, Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[2]College of Medicine and Life Sciences, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[3]Assistant Professor, Division of Internal Medicine, Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[4]Retired, Division of Internal Medicine, Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[5]Professor, Division of Internal Medicine, Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[6]Professor, Chair of the Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

[7]Professor, Interim Division Chief of Internal Medicine, Department of Medicine, 3000 Arlington Avenue, The University of Toledo, Toledo OH 43615

Email: mani.askari@utoledo.edu

Received: 2024-08-14

Accepted: 2024-09-16

Published: 2025-06-30

Introduction: Previous studies have demonstrated that smokers are more likely to have lower circulating vitamin D levels, with recent research highlighting that nicotine and other compounds in tobacco smoke significantly increase vitamin D metabolism. Given vitamin D's important role in cell proliferation and immune response, deficiency is associated with chronic obstructive pulmonary disease exacerbations, mycobacterium infections, and chronic inflammatory pulmonary changes. A 2024 study using NHANES data identified a negative association between tobacco smoke exposure and serum vitamin D levels, underscoring smoking as a modifiable risk factor for deficiency.

https://dx.doi.org/10.46570/utjms-2025-1434

Methods: This study analyzed data from the NHANES 2017-2018 database. Smoking status was assessed via cotinine levels, a biomarker for nicotine exposure, while vitamin D levels were measured using 25OHD2+25OHD3 (nmol/L). Weighted linear regression examined the association between vitamin D and cotinine levels, and a weighted logistic regression predicted vitamin D status, adjusting for age, body weight, and vitamin D supplementation.

Results: A significant negative association between cotinine levels and vitamin D was observed ($p=0.009$), indicating that higher nicotine exposure leads to a 37% reduction in vitamin D levels. Individuals over 60 had 1.83 times higher odds of lower vitamin D levels, and those with higher body weight had significantly lower vitamin D levels (OR = 0.68, 95% CI 0.51-0.92). Lack of vitamin D supplementation was strongly associated with lower vitamin D levels ($p<0.0001$).

Conclusion: Our study confirms a negative association between smoking and vitamin D levels, even after adjusting for age, body weight, and vitamin D supplementation. Monitoring vitamin D status in smokers and considering supplementation are crucial for mitigating health risks.

Keywords: Smoking, NHANES data, Vitamin D Deficiency

https://dx.doi.org/10.46570/utjms-2025-1434