ANEMIA PREVALENCE AND TRENDS IN ADULTS AGED 65 AND OLDER: U.S. NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY: 2001–2004 TO 2013–2016

Amy E. Seitz, MPH, PhD, **Mark S. Eberhardt, PhD**, **Susan L. Lukacs, DO, MSPH**

Division of National Health and Nutrition Examination Survey, National Center for Health Statistics Centers for Disease Control and Prevention, Hyattsville, MD

To the Editor: The prevalence of anemia is known to increase with age and is associated with negative health outcomes, including greater risk of hospitalizations and greater mortality.[1] Anemia in older adults can be due to nutrient deficiencies, chronic kidney disease, chronic inflammation, or inflammatory disease or can be unexplained.[2] Because of the potential health consequences and potentially changing prevalence of underlying causes, it is important to have updated national anemia estimates and trends over time for this population.

METHODS

We used the National Health and Nutrition Examination Survey (NHANES) to describe anemia prevalence and trends for participants aged 65 and older. We included the 2001–2002 through 2015–2016 survey cycles, combining two survey cycles from 2001–2004 to 2013–2016 for the analysis. The National Center for Health Statistics (NCHS) conducts NHANES, a nationally representative multistage probability survey. Participants complete an in-home interview and a clinical and laboratory examination in a mobile examination center (MEC). Because of potential disclosure risk, age was censored at 80 and above in the public use NHANES data files starting in 2007, and we accessed data through the NCHS Research Data Center. The analytical sample consisted of 9,874 individuals.

Hemoglobin values are available as part of the NHANES complete blood count analysis performed in the MEC Clinical Laboratory Improvement Amendments–approved laboratory. Men with a hemoglobin level less than 13 g/dL and women with a hemoglobin level less than 12 g/dL were classified as anemic according to World Health Organization standards.[3]

We used SAS version 9.3 (SAS Institute, Inc., Cary, NC) and SAS-callable SUDAAN version 11.0.1 (Research Triangle Institute, Research Triangle Park, NC) for data analysis. We used survey design variables to account for complex sampling, t-statistics to compare proportions, and regression analysis trends. Statistical significance was determined using two-sided P<.05. We used the Korn and Graubard[4] small percentage confidence interval (CI) method to calculate CIs for percentages.

The NCHS Research Ethics Review Board approved NHANES.

RESULTS

In 2013–16, we found an overall anemia prevalence of 14.1% (95% CI=11.8–16.7) for men and 10.2% (95% CI=8.5–12.1) for women aged 65 and older. In 2013–2016, anemia prevalence significantly increased with age (men: 65–74, 7.4%; 75–84, 21.5%; 85, 39.5%; Figure 1A; women: 65–74, 7.6%; 75–84, 11.0%; 85, 21.9%; Figure 1B). These trends with increasing age were noted in all survey cycles for men (Figure 1A) and all survey cycles except 2009–2012 for women (Figure 1B).

Over time, we observed a significant increasing linear trend in anemia prevalence from 2001–2004 (24.2%) to 2013–2016 (39.5%) in men aged 85 and older (Figure 1A). The prevalence of anemia in men aged 75 to 84 increased during this time period, but the increase was not significant. For men aged 65 to 74, there was no significant trend over time. In women, anemia prevalence increased from 2001–2004 to 2013–2016 for all age groups, but the linear trends were not significant (Figure 1B), although we identified a significant quadratic trend for women aged 65 to 74 (Figure 1B).

DISCUSSION

This report presents updated national estimates of anemia prevalence and shows increasing trends with age and over time. Previous literature from NHANES 1988–1994 showed that approximately 26% of men aged 85 and older had anemia[2], similar to our results in 2001–2004. However, our more recent analysis showed that anemia prevalence increased over time for men aged 85 and older and in 2013–2016 anemia prevalence was higher for both men and women aged 85 and older compared to younger age groups. Reasons for these patterns are probably multifactorial and could include changes in chronic health conditions contributing to anemia which could differ by age, sex, or over time. For example, the incidence of end-stage renal disease peaks at approximately age 80 to 85 and is higher in men[5], and approximately 53% of persons with Stage 5 chronic kidney disease had anemia.[6] Also, malnutrition in older persons is common[7] and may be related to pathogenesis of chronic conditions such as inflammatory bowel disease[8] or directly related to anemia[2].

Anemia estimates shown here may be an underestimate. Anemia in homebound older adults has been found to be 4 times as high as that reported from NHANES III data[9], and NHANES does not include institutionalized persons, a population with higher rates of anemia[10], but these estimates are representative of the general noninstitutionalized U.S. population.

Information on how anemia prevalence has changed over time within sex and age groups adds to the literature and supports the need for additional research. These most recent estimates of anemia in older adults from a nationally representative survey may help inform clinicians caring for this population.

ACKNOWLEDGMENTS

REFERENCES

1. Culleton BF, Manns BJ, Zhang J, Tonelli M, Klarenbach S, Hemmelgarn BR. Impact of anemia on hospitalization and mortality in older adults. Blood 2006;107:3841–3846. [PubMed: 16403909]

2. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: Evidence for a high rate of unexplained anemia. Blood 2004;104:2263–2268. [PubMed: 15238427]

3. World Health Organization. Haemoglobin Concentration for the Diagnosis of Anaemia and Assessment of Severity. Vitamin and Mineral Nutrition Information System. 2011 (online). Available at http://www.who.int/vmnis/indicators/haemoglobin.pdf Accessed February 21, 2018.

4. Graubard BI, Korn EL. Predictive margins with survey data. Biometrics 1999;55:652–659. [PubMed: 11318229]

5. Albertus P, Morgenstern H, Robinson B, Saran R. Risk of ESRD in the United States. Am J Kidney Dis 2016;68:862–872. [PubMed: 27578184]

6. Stauffer ME, Fan T. Prevalence of anemia in chronic kidney disease in the United States. PloS One 2014;9:e84943. [PubMed: 24392162]

7. Volkert D Malnutrition in older adults—urgent need for action: A plea for improving the nutritional situation of older adults. Gerontology 2013;59: 328–333. [PubMed: 23406648]

8. Levine A, Sigall Boneh R, Wine E. Evolving role of diet in the pathogenesis and treatment of inflammatory bowel diseases. Gut 2018.

9. Argento V, Roylance J, Skudlarska B, Dainiak N, Amoateng-Adjepong Y. Anemia prevalence in a home visit geriatric population. J Am Med Dir Assoc 2008;9:422–426. [PubMed: 18585644]

10. Artz AS, Fergusson D, Drinka PJ et al. Prevalence of anemia in skilled-nursing home residents. Arch Gerontol Geriatr 2004;39:201–206. [PubMed: 15381339]
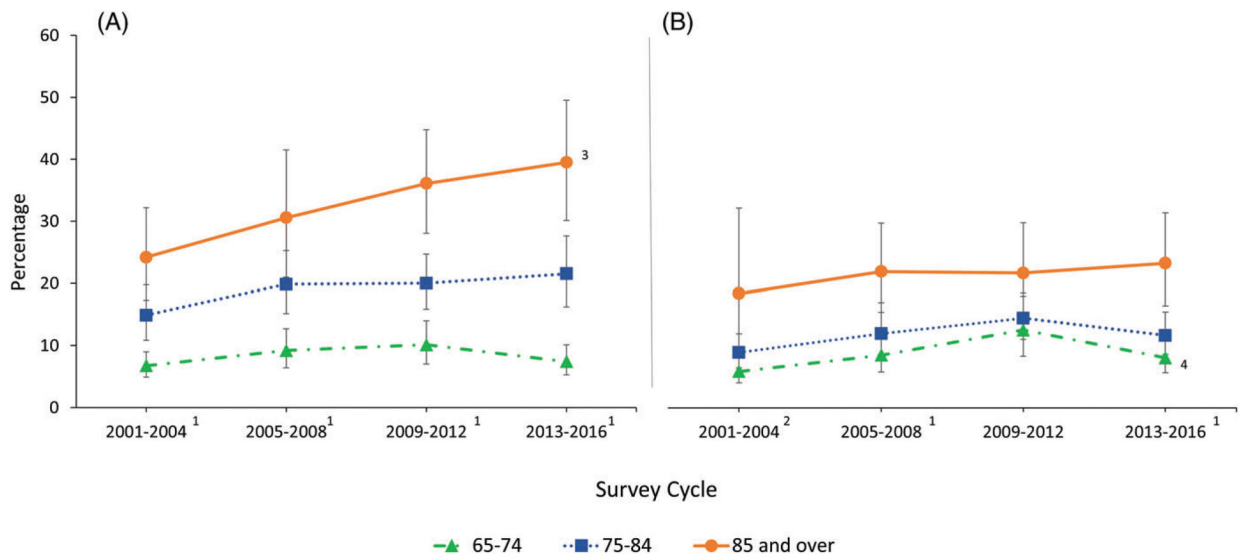
Figure 1.

Percentage of (A) men and (B) women aged 65 and older with anemia according to age group, National Health and Nutrition Examination Survey, United States, 2001–04 to 2013–16. Anemia was defined as hemoglobin <13 g/dL for men and <12 g/dL for women. [1]Linear trend within survey cycle according to age group significant at P<.001. [2]Linear trend within survey cycle according to age group significant at P=.03. [3]Linear trend within age group according to survey cycle significant at P=.01. [4]Quadratic trend within age group according to survey cycle significant at P=.03.