Trends in the Prevalence of Coronary Heart Disease in the U.S.

National Health and Nutrition Examination Survey, 2001–2012

Sung Sug (Sarah) Yoon, PhD, RN,[1] Charles F. Dillon, MD, PhD,[2] Kachi Illoh, MD, MPH,[3] Margaret Carroll, MSPH[4]

Introduction: This study evaluated recent trends in the prevalence of coronary heart disease in the U.S. population aged ≥40 years.

Methods: A total of 21,472 adults aged ≥40 years from the 2001–2012 National Health and Nutrition Examination Survey were included in the analysis. The analysis was conducted in 2015. Coronary heart disease included myocardial infarction, angina, and any other type of coronary heart disease, which were defined as a history of medical diagnosis of these specific conditions. Angina was also defined as currently taking anti-angina medication or having Rose Angina Questionnaire responses that scored with a Grade ≥1. Trends from 2001 to 2012 were analyzed overall, within demographic subgroups, and by major coronary heart disease risk factors.

Results: Between 2001 and 2012, the overall prevalence of coronary heart disease significantly decreased from 10.3% to 8.0% (p-trend <0.05). The prevalence of angina significantly decreased from 7.8% to 5.5% and myocardial infarction prevalence decreased from 5.5% to 4.7% (p-trend <0.05 for both groups). Overall coronary heart disease prevalence significantly decreased among women, adults aged >60 years, non-Hispanic whites, non-Hispanic blacks, adults who did not complete high school, adults with more than a high school education, and adults who had health insurance (p-trend <0.05 for all groups).

Conclusions: The overall prevalence of coronary heart disease including angina and myocardial infarction decreased significantly over the 12-year survey period. However, this reduction was seen mainly among persons without established coronary heart disease risk factors. There was no change in coronary heart disease prevalence among those with specific coronary heart disease risk factors.
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Introduction

Coronary heart disease (CHD), defined as angina; myocardial infarction (MI); and related disorders of the coronary arteries, is a leading cause of death in the U.S.[1] A substantial burden of morbidity and mortality due to CHD is attributable to modifiable and treatable risk factors such as hypertension, dyslipidemia, smoking, diabetes, obesity, and overweight.[2,3] Recent trends in the prevalence of CHD risk factors have shown a mixed picture: The prevalence of smoking has significantly decreased,[4] but the prevalence of obesity has not changed and diabetes has increased.[5,6] The prevalence of high blood pressure and measured abnormal cholesterol has not changed in the last 12 years, but control rates among those with hypertension and hypercholesterolemia have significantly improved over this time period.[7–9] Increasing awareness, treatment, and reduction of CHD risk factors may have contributed to an overall decrease in CHD mortality.[10,11] Further, the use of medical and surgical treatments has resulted in an overall decline in CHD-related deaths.[10,11] Several reports have assessed

From the [1]Healthcare Delivery and Methodologies IRG, Division of AIDS, Behavioral, and Population Sciences, Center for Scientific Review, NIH, Bethesda, Maryland; [2](Retired) National Center for Health Statistics, CDC, Hyattsville, Maryland; [3]Office of New Drugs Immediate Office, the Center for Drug Evaluation and Research, Food and Drug Administration, Silver Spring, Maryland; and [4]Division of Health and Nutrition Examination Surveys, National Center for Health Statistics, CDC, Hyattsville, Maryland

Address correspondence to: Sung Sug (Sarah) Yoon, PhD, RN, Healthcare Delivery and Methodologies IRG, Division of AIDS, Behavioral, and Population Sciences, Center for Scientific Review, NIH, 6701 Rockledge Drive, Room 3152 (MSC 7770), Bethesda MD 20892. E-mail: sarah.yoon@nih.gov.

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recent trends in U.S. mortality attributable to CHD,[2,3] yet comparatively less is known about recent trends in CHD and, specifically, MI and angina. The objectives of the present study were to use the most recently available data from the National Health and Nutrition Examination Survey (NHANES) to estimate recent U.S. trends in the prevalence of CHD overall, and MI and angina specifically, as well as provide trends according to demographic characteristics and selected CHD risk factors.

Methods

The NHANES has a complex, multistage sample design and is representative of the non-institutionalized civilian U.S. population.[12] NHANES data collection consists of an initial health interview carried out in the respondent's home and then a health examination in a mobile examination center. The interview contains questions on sociodemographic characteristics (age, gender, education, race/Hispanic origin, and health insurance) and questions on previously diagnosed medical conditions. More detailed information on the NHANES is available elsewhere.[12] Informed consent was obtained from all adult participants, and the National Center for Health Statistics Research Ethics Review Board approved the protocol. This study was based on analysis of data for six 2-year NHANES survey cycles: 2001–2002, 2003–2004, 2005–2006, 2007–2008, 2009–2010, and 2011–2012. Overall interview response rates for these years ranged from 73% to 84%, and examination response rates ranged from 70% to 80%.[13]

Measures

The study variable for overall CHD was defined as a person who had angina and MI. Participants were classified as having an MI or other CHD if they answered affirmatively to ever having been told by a doctor or other health professional that they had a heart attack (also called MI). Participants were classified as having angina if they answered affirmatively to ever having been told they had angina, also called angina pectoris, or if they reported use of a prescription anti-angina medication in the past 30 days or had undiagnosed angina based on Rose Angina Questionnaire (Grade ≥1). Use of anti-angina medication prescriptions in the past 30 days was obtained during the in-person household interview using a medication inventory method. Participants who reported the use of the following anti-angina medications were classified with angina: nitroglycerin, isosorbide dinitrate, and isosorbide mononitrate. Further details of the NHANES prescription drug data collection are reported elsewhere.[14,15] The Rose Angina Questionnaire uses an individual's chest pain symptom history to define angina cases. This instrument is widely used in epidemiologic studies as a validated, standardized method for defining angina pectoris in the general population. The validity of this instrument has been assessed in a number of studies,[16–18] comparing it with a clinical diagnosis of angina, electrocardiogram abnormalities, and as a predictor of mortality due to coronary artery disease. This allowed the study angina case definition to include undiagnosed as well as diagnosed cases. Congestive heart failure was not included in the definition of CHD in the present analysis.

Demographic variables were categorized as age (40–59 and ≥60 years); gender (male, female); education (less than high school, high school graduate [including GED], and more than high school); race/Hispanic origin (non-Hispanic white, non-Hispanic black, and Mexican American); and health insurance status (insured, not insured). Because of the relatively small sample sizes, participants of other race/Hispanic origins were included in overall prevalence estimates but not reported separately.

The major CHD risk factors that were included in the analysis were hypertension, hypercholesterolemia, BMI, diabetes, and cigarette smoking. Using the NHANES health examination data, hypertension was defined as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or participant report of currently taking medication to lower high blood pressure.[19] Hypercholesterolemia was defined as a measured total serum cholesterol of ≥240 mg/dL or self-report of currently taking medication to lower cholesterol.[20]

Although BMI is not currently considered a primary CHD risk factor, it is an accepted risk factor for diabetes and hypertension and was therefore included in the temporal trend reporting. BMI was calculated as measured weight in kilograms divided by height in meters squared rounded to the nearest tenth, and categorized as <18.5, underweight; 18.5–24.9, normal weight; 25.0–29.9, overweight; and ≥30, obese. Owing to small sample sizes, people in the underweight category were included in total estimates but not reported separately. Diagnosed diabetes mellitus was defined by self-report of a healthcare provider diagnosis of diabetes. Current cigarette smoking was defined as having smoked at least 100 cigarettes during one's lifetime and currently smoking every day or some days.

From 2001 to 2012, a total of 21,604 adults aged ≥40 years were both interviewed and examined. After excluding those with missing or invalid values for the questions defining CHD (n=132), 21,472 adults were included in the analysis. A total of the missing or invalid values were 34, 17, 20, 19, 25, and 17 from 2001–2002 to 2011–2012 in each survey period.

Statistical Analysis

Statistical analyses were conducted in 2015 using SAS, version 9.3, and SUDAAN, version 11.0. Examination sample weights that adjusted for differential selection probabilities, non-response, and non-coverage were used to produce estimates representative of the non-institutionalized civilian U.S. population. Age-adjusted prevalence estimates were calculated for gender, age, education level, race/ethnicity, health insurance categories, and selected risk factors using SUDAAN Proc Descript and the 2000 projected U.S. population age groups for 40–59 and ≥60 years.[21] SEs of the prevalence estimates were estimated by Taylor Series linearization, a design-based approach. Statistical hypotheses were tested (univariately) using a two-tailed Student's t-test at the α=0.05 level.[22] Trends in CHD, MI, and angina by demographic characteristics and selected CHD risk factors were tested univariately using orthogonal contrast matricies.[23] Statistical hypotheses were tested at α=0.05 using a Satterthwaite adjusted F-test.

Results

Table 1 presents age-adjusted CHD prevalence estimates from 2001 to 2012 by selected demographic variables. The prevalence of CHD among adults aged ≥40 years

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