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Causes and demographic, medical, lifestyle and psychosocial predictors of premature mortality: the CARDIA study

Carlos Iribarren[a,*], David R. Jacobs[b], Catarina I. Kiefe[c,d], Cora E. Lewis[c], Karen A. Matthews[e], Jeffrey M. Roseman[c], Stephen B. Hulley[f]

[a] *Division of Research, Kaiser Permanente, Oakland, CA, USA*
[b] *Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis, MN, USA*
[c] *Division of Preventive Medicine, University of Alabama at Birmingham, AL, USA*
[d] *Birmingham Veterans Affairs Medical Center, Birmingham, AL, USA*
[e] *Department of Psychiatry, University of Pittsburgh, PA, USA*
[f] *Department of Epidemiology and Biostatistics, University of California, San Francisco, CA, USA*

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Abstract

We examined the 16-year mortality experience among participants in the baseline examination (1985–86) of the Coronary Artery Risk Development in Young Adults (CARDIA) Study, a U.S. cohort of 5115 urban adults initially 18–30 years old and balanced by sex and race (black and whites) in the USA. We observed 127 deaths (annual mortality of 0.15%). Compared to white women, the rate ratio (95% confidence interval) of all-cause mortality was 9.3 (4.4, 19.4) among black men, 5.3 (2.5, 11.4) among white men and 2.7 (1.2, 6.1) among black women. The predominant causes of death, which also differed greatly by sex–race, were AIDS (28% of deaths), homicide (16%), unintentional injury (10%), suicide (7%), cancer (7%) and coronary disease (7%). The significant baseline predictors of all-cause mortality in multivariate analysis were male sex, black race, diabetes, self-reported liver and kidney disease, current cigarette smoking and low social support. Two other factors, self-reported thyroid disease and high hostility, were significant predictors in analyses adjusted for age, sex and race. In conclusion, we found striking differences in the rates and underlying cause of death across sex–race groups and several independent predictors of young adult mortality that have major implications for preventive medicine and social policies.

Keywords: Mortality; Young adults; Risk factors; Race/ethnicity; Smoking; Psychosocial factors; Hostility; Social support; USA

Introduction

For most of the 20th century, injuries have been the predominant cause of young adult mortality. Before 1980, young adult mortality in the US was primarily due to the three main classes of injuries: homicide, suicide and unintended injuries (Singh & Yu, 1996). During the 1980s to early 1990s, HIV/AIDS emerged as the leading cause of death among persons aged 25–44 in the US, causing an upward mortality trend for young men (Buehler, Devine, Berkelman, & Chevarley, 1990; Anonymous, 1993) that has been reversed in the last several years by the introduction of highly active antiretroviral therapy (Anonymous, 2001). National trend data between 1988 and 1993 indicate that, in persons born between 1960 and 1974, HIV incidence in

*Corresponding author. Tel.: +1-510-891-3554; fax: +1-510-891-3606.
E-mail address: cgi@dor.kaiser.org (C. Iribarren).

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homosexual men and injection drug users were slowing by 1993; however, this favorable trend was offset by increasing heterosexual transmission, especially in minorities (Rosenberg & Biggar, 1998). The number of diagnosed HIV infections declined in the US during 1994–1997 and remained constant during 1998–2000 (Anonymous, 2002).

Less is known, however, about the correlates or determinants of young adult mortality. Given the potential years of life lost, a better understanding of these predictors could be helpful for planning interventions to ameliorate young adult mortality.

Prior studies conducted in large, nationally representative data sets suggest that demographic and socioeconomic position indicators (including sex, black race/ethnicity, low income, low educational attainment, unemployment and being unmarried) are associated with increased risk of death in this age group (Geronimus, Bound, Waidmann, Hillemeier, & Burns, 1996; Sorlie, Backlund, & Keller, 1995; US Bureau of the Census, 1993; Geronimus, Bound & Waidmann, 1999; Smith & Waitzman, 1997). Certain medical comorbidities that are relatively common in young adulthood (such as asthma or diabetes) have also been found to increase the risk of death during young adulthood (Mannino et al., 2002; Wibell et al., 2001).

In middle-aged or older adults, lifestyle factors, notably cigarette smoking, heavy alcohol intake and sedentary lifestyle have been identified as important predictors of all-cause and cause-specific mortality (Lantz et al., 1998; Lee & Paffenbarger, 2000). Overweight and obesity are major and increasing determinants of morbidity and mortality in Americans and other westernized societies (Lantz et al. (1998)). Being underweight, although less well understood because of confounding by ill health, has also been associated with increased all-cause mortality rates (Sidney, Friedman, & Siegelaub, 1987; Gaesser, 1999; Wannamethee, Shaper, & Walker, 2001). Among older persons, psychosocial factors (specifically hostility and lack of social support) are associated with worse survival (Barefoot, Dahlstrom, & Williams, 1983; Saz & Dewey, 2001; Berkman, Leo-Summers, & Horwitz, 1992), but empirical evidence concerning the role that these factors may play in premature mortality among young adults is lacking.

One aim of this study is to describe the causes of mortality over a 16-year period (1985–2001) among participants in the Coronary Artery Risk in Young Adults (CARDIA) Study, a cohort of urban young adults living in four US metropolitan areas. A second aim was to examine the independent correlates of cause-specific and all-cause mortality drawing on a rich set of sociodemographic, medical, lifestyle and psychosocial factors.

Materials and methods

Cohort description and procedures

CARDIA is a longitudinal investigation of heart disease risk factors and sub-clinical coronary disease in a population of black and white men and women 18–30 years old at baseline in 1985–86. The sampling strategy resulted in a cohort balanced by race/ethnicity (52 percent black, 48 percent white), sex (55 percent female, 45 percent male), age (45 percent 18–24 years, 55 percent 25–30 years) and education level (40 percent with ≤ 12 years, 60 percent >12 years of education, respectively). More details of study design, recruitment and procedures can be found elsewhere (Hughes et al., 1987; Friedman et al., 1988). Briefly, participants were recruited by randomly digit dialing in Birmingham, Alabama, Chicago, Illinois and Minneapolis, Minnesota (where door-to-door recruitment was also used in areas with low telephone subscription), and at random from the membership files of the Kaiser Permanente Medical Care Program in Oakland, California. The baseline examination was completed in 1985–86 with a total of 5115 attendees. Subsequent re-examinations have taken place at years 2 (1987–88), 5 (1990–91), 7 (1992–93), 10 (1995–96) and 15 (2000–2001), with high retention rates (91 percent at year 2, 86 percent at year 5, 81 percent at year 7, 79 percent at year 10 and 73 percent at year 15). Mortality follow-up was essentially complete.

All the independent variables used in the current analysis were measured at the baseline examination. Race/ethnicity was obtained by self-report at the screening interview and verified by written questionnaire during the clinic visit. Educational attainment (with three levels: elementary, junior high or high school, college and graduate school), employment status and marital status were ascertained by self-report. Several co-morbid conditions (cancer or tumor, liver disease, heart disease, kidney disease, mental illness and thyroid disease) were ascertained by self-report only.

Asthma was defined as self-report and/or use of asthma medication. Diabetes was defined as self-report and/or fasting blood glucose >126 mg/dl and/or use of anti-diabetic medication. Hypertension was defined as self-report and/or systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg and/or use of anti-hypertensive medication. An interviewer-administered 1-year physical activity history was given to each participant. Responses were scored by adding the number of months that each of several activities was performed, weighted by the frequency and intensity of the activity in kcal/min, to yield a total activity score (Jacobs, Hahn, Haskell, Pirie, & Sidney, 1989). Use of alcohol (coded as tertiles of consumption based on sex/race specific cut-points determined among drinkers) and cigarette smoking (never, former and current) were