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Prevalence and changes over time of ideal cardiovascular health metrics among African–Americans: The Jackson Heart Study

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ABSTRACT

Objectives. The aim of this study is to assess the prevalence and changes over time of ideal Life's Simple Seven (LSS) in African–Americans.

Methods. Prospective cohort of 5301 African–Americans from the Jackson Heart Study (JHS) from 2000 to 2013. Each of the LSS metrics was categorized as poor, intermediate, or ideal.

Results. Among men, the prevalence of having 0, 1, 2, 3, 4, 5, 6, and 7 ideal LSS was 3.3%, 23.0%, 33.5%, 24.7%, 11.6%, 3.6%, 0.3%, and 0%, respectively. Corresponding values for women were 1.7%, 26.3%, 33.1%, 22.8%, 11.9%, 3.7%, 0.6%, and 0%. Prevalence of ideal diet was 0.9%. The proportions of those meeting LSS ideal recommendations for cholesterol and fasting glucose declined from the first through third JHS visits across all age groups, whereas prevalence of ideal BMI declined only in participants <40 years at a given visit. Prevalence of ideal blood pressure did not change over time and being ideal on physical activity improved from the first [18.3% (95% CI: 17.3% to 19.3%)] to third visit [24.8% (95% CI: 23.3% to 26.3%)].

Conclusions. Our data show a low prevalence of ideal LSS (especially diet, physical activity, and obesity) in the JHS and a slight improvement in adherence to physical activity recommendations over time.

Introduction

Despite the identification of major cardiovascular risk factors in the early 1960s (Kannel et al., 1961) and advances in biomedical research, cardiovascular disease (CVD) remains the leading cause of death in the US (Go et al., 2013). People who maintain ideal levels of physical activity, diet, adiposity, blood pressure, lipids, etc., have fewer adverse health outcomes (i.e., CVD) (Stamler et al., 1999; Stampfer et al., 2000; Hozawa et al., 2007). Hence, the American Heart Association (AHA)'s goal is to improve the cardiovascular health of all Americans by 20% by year 2020 while reducing deaths from cardiovascular diseases by 20% (Lloyd-Jones et al., 2010). To monitor such goals, AHA developed a simple metric based on 4 health [adiposity, total cholesterol, blood pressure (BP) and fasting plasma glucose (FPG)] and 3 behavioral (smoking, exercise and diet) factors, subsequently referred to as life's simple seven (LSS). These 7 factors are then used to define the concept of poor, intermediate, and ideal cardiovascular health (Lloyd-Jones et al., 2010). Recent data from a US representative sample showed that fewer than 1% of adult Americans met all 7 metrics, with ideal healthy diet met by the fewest (Shay et al., 2012). Another report showed variations in the prevalence of meeting ideal LSS, with age-standardized prevalences varying from 1.2% to 6.6% across the 50 US states (Fang et al., 2012). Of note is that Mississippi – home state of the JHS – was among the states with the lowest age-standardized prevalence of ideal LSS.

Abbreviations: AHA, American Heart Association; BMI, Body mass index; BP, Blood pressure; CI, Confidence interval; CVD, Cardiovascular disease; FFQ, Food frequency questionnaire; FPG, Fasting plasma glucose; JHS, Jackson Heart Study; LSS, Life's simple seven; MET, Metabolic equivalent.

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There is a disproportionate burden of CVD in the African–American population, with higher prevalences of major risk factors including hypertension, overweight/obesity, type 2 diabetes, and physical inactivity, compared with other ethnic groups (Go et al., 2013; Lloyd-Jones et al., 2009). While one publication from the National Health and Nutrition Examination Survey (NHANES) (Go et al., 2013) reported comparable overall prevalences across ethnic groups, detailed data on the prevalence of poor, intermediate, and ideal dietary components among African–Americans have not been reported. In addition, there are no data on changes over time in LSS in a large cohort of African–Americans. Such data are critical in monitoring milestones towards achieving the AHA 2020 goals and reduce the burden of chronic diseases in a high-risk population. The JHS is unique in its ability to address the above gaps among middle-aged and elderly African–Americans, given the availability of data on all seven health and behavioral factors and repeated measurements on most of those factors (BMI, cholesterol, FPG, BP, and physical activity) during its initial three clinic visits. Hence, the current project examines the prevalence and changes over time of LSS in a large cohort of African–Americans.

Methods

Population

The JHS is a prospective cohort study designed to investigate determinants of CVD among African–Americans living in the tri-county area (Hinds, Madison, and Rankin counties) of the Jackson, Mississippi metropolitan area. Detailed descriptions of the JHS have been previously published (Taylor et al., 2005; Fuqua et al., 2005). Of the 5301 JHS participants who completed the baseline clinic visit (2000–2004), we excluded 1169 subjects who had missing data on one or more LSS. This resulted in a final sample of 4132 individuals with complete data at the baseline JHS visit. The JHS visit two was conducted between 2005 and 2009, and visit three was completed from 2009 to 2013. Each participant gave written informed consent, and the study protocol was approved by the institutional review boards of each of the participating institutions.

Assessment of LSS

A definition of LSS (poor, intermediate, and ideal) based on AHA guidelines is provided in Supplemental Table 1.

Body mass index (BMI)

Standing height was measured without shoes and recorded to the nearest centimeter. Weight was measured at baseline on a scale. BMI was computed by dividing weight (kg) by height squared (m^2). Briefly, ideal, intermediate, and poor BMI were defined as BMI <25; 25 to 29.9; and ≥30 kg/m^2, respectively.

Physical activity

At baseline, participants completed an interviewer-administered physical activity survey. The instrument used was similar to the Kaiser physical activity survey, and derived from the Baeke physical activity and Atherosclerosis Risk in Communities (ARIC) surveys (Dubbert et al., 2005; Ainsworth et al., 2000). Reported activity was organized into four domains: sports and exercise; active living; occupational activity; and home, family, yard and garden activity. To maintain comparability with Bell et al. (2013), who used ARIC physical activity survey data, only activity compiled by the sport and exercise component of the instrument was used in the current analysis. Sport and exercise was reported by named activity and the average amount of time per week spent at that activity. Metabolic equivalent (MET) levels for each named activity were taken from the most current version of the national Compendium of Physical Activity (Ainsworth et al., 2011). Activities identified as either vigorous (>6 METs) or moderate (3–6 METS) (Centers for Disease Control, 2013) contributed to the participant's physical activity score for the purpose of this analysis. The average time per week spent engaged in all activities at either a vigorous or moderate level was tallied for each participant. Each participant was then scored as having one of the three AHA recommended levels of physical activity (Lloyd-Jones et al., 2010): 1) *Recommended*: ≥150 min/wk of moderate activity or ≥75 min/wk of vigorous activity or ≥150 min/wk of moderate + vigorous activity; *Intermediate*: 1–149 min/wk of moderate activity or 1–74 min/wk of vigorous activity or 1–149 min/wk of moderate + vigorous activity; *Poor*: 0 min/wk of physical activity.

Dietary assessment

Dietary intakes in the JHS were assessed using a regional and culturally appropriate, 158 food item, semi quantitative food frequency questionnaire (FFQ) that was designed specifically for the study population (Tucker et al., 2005). The FFQ has been validated in a subset of the JHS cohort using multiple 24-h recalls and nutrient biomarkers (Carithers et al., 2009; Talegawkar et al., 2008). We had FFQ information for 5065 of the 5301 JHS participants at baseline. We excluded 304 participants with extreme energy intakes (defined as ≤600 kcal/d or ≥4800 kcal/d) and included 4761 participants for the computation of diet score based on AHA guidelines. Individuals were given one point for each of 5 dietary goals. These included: 1) At least 4.5 cups/day of fruit and vegetables (fruit included whole fruit and 100% fruit juice; vegetables included orange and green leafy vegetables, root and starchy vegetables (including sweet potatoes and potatoes), tomatoes, and other vegetables such as peppers and onions—however, fried preparations including French fried potatoes and fried onion rings were excluded); 2) at least two 3.5 oz servings/week of fish (shellfish and any fried or fast food preparations such as fried catfish and fish sandwiches were excluded); 3) at least three 1 oz servings/day of fiber rich whole grains (estimated by identifying all foods on the FFQ which contained grains, and calculating the total exposure to whole grains); 4) no more than 36 fluid oz/week of sugar-sweetened beverages (including non-diet soda, fruit drinks sweet tea and sweetened coffee); 5) less than 1500 mg of sodium/day [from direct nutrient analysis of the FFQ, using the Nutrition Data System for Research, NDS-R, version 4.04, 2001 (Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN)].

Smoking

At baseline, participants were asked if they had smoked at least 400 cigarettes in their life, if they currently smoked cigarettes, and the number of years since they last smoked, if participants indicated that they no longer smoked cigarettes. Participants were then classified as a current, former, or never smoker. Former smokers were further divided into those who had quit smoking less than 12 months or ≥12 months prior to the interview. Ideal smoking was defined as never smokers or former smoker who had quit ≥12 months ago. Intermediate smoking was defined as former smokers who had quit within the past year, and poor smoking was defined as current smokers.

Assessment of blood pressure (BP), fasting plasma glucose (FPG), and cholesterol

BP was calculated the average of two sitting BP measures using an appropriate cuff size (Hickson et al., 2011). FPG was measured by glucose oxidase colorimetric method using a Vitros 950 or 250, Ortho-Clinical Diagnostics analyzer at baseline and by Roche Modular P Chemistry analyzer at clinic visits 2 and 3. Total cholesterol was measured by the cholesterol oxidase method as described previously (Carpenter et al., 2004).

Participants were asked to bring all medications they had been taking during the two weeks prior to each clinic visit. Medications were defined as antihypertensive, hypoglycemic, or statin, based on the Therapeutic Classification System. Medication accountability was also assessed to determine if all medications were brought to the clinic visit. If needed, follow-up telephone calls were performed to obtain medication information.

Poor blood pressure was defined as systolic BP ≥ 140 mm Hg or diastolic BP ≥ 90 mm Hg; intermediate as systolic BP ≥ 120 and <140 mm Hg or diastolic BP ≥ 89 and <90 mm Hg, untreated, or systolic BP < 120 mm Hg and diastolic BP < 80 mm Hg if treated; and ideal as systolic BP < 120 and diastolic BP < 80 mm Hg, if untreated. Poor glucose was defined as FPG ≥ 126 mg/dL or HbA1c ≥ 6.5% or reported diabetes medication use; intermediate as FPG ≥ 100 mg/dL and <126 mg/dL, or HbA1c ≥ 5.7% and <6.5%, untreated; and ideal as FPG < 100 mg/dL and HbA1c < 5.7% untreated. Poor cholesterol was defined as total cholesterol ≥240 mg/dL; intermediate as ≥200 mg/dL and <240 md/dL untreated, or <200 mg/dL treated; and ideal as <200 mg/dL untreated.

Repeated assessment of LSS over time

Assessments of BMI, BP, FPG and total cholesterol were repeated during the JHS Visit 2 (2005–2009) and Visit 3 (2009–2013), while physical activity was reassessed only during the JHS Visit 3. Dietary intake information was available only at the JHS baseline examination.