Study finds targeting 'ideal cardiovascular health' lowers diabetes risk, but with ethnic differences

8 June 2016

A new study published in *Diabetologia* (the journal of the European Association for the Study of Diabetes [EASD]) shows that significant differences by race/ethnicity exist in the degree of association between measures of cardiovascular health (together constituting 'ideal cardiovascular health') and the risk of diabetes, and that as many as three out of five cases of diabetes may be attributable to poor cardiovascular health factors.

The research conducted by Dr Joshua J. Joseph, Johns Hopkins University School of Medicine, Baltimore, USA) and colleagues examined the links between incident type 2 diabetes and cardiovascular health within a multi-ethnic population in the United States from 2002 to 2012.

Cardiovascular disease (CVD) and diabetes share a number of risk factors including physical inactivity , obesity, unhealthy dietary habits, and to a lesser extent, elevated blood pressure and abnormal blood fat levels. CVD is the leading cause of disability, poor health and death in individuals with diabetes, who have a mortality rate from CVD three times higher than that in the non-diabetic population.

In 2010, as part of an initiative to improve cardiovascular health and reduce deaths from cardiovascular disease and stroke by 20% by the year 2020, the American Heart Association (AHA) defined the concept of ideal cardiovascular health (ICH). This was based on seven health factors or behaviours which had been identified as being associated with healthy ageing without the burden of CVD or other chronic diseases. These factors are: total cholesterol, blood pressure, fasting plasma glucose, dietary intake, tobacco use, physical activity and body-mass index (BMI).

A small number of earlier studies have provided evidence that adherence to the components of ICH varies by ethnicity, and one study of American Indians showed that meeting a greater number of ICH goals was associated with a reduced risk of diabetes. This is however the first study of its kind to assess the association of baseline ICH with incident diabetes within a multi-ethnic population.

Participants in the study were drawn from the Multi-Ethnic Study of Atherosclerosis (MESA), a large population-based sample of 6,814 men and women aged 45-84 at baseline from four ethnic groups: non-Hispanic whites (NHW; 38%), African Americans (AA; 28%), Chinese Americans (CA; 12%), and Hispanic Americans (HA; 22%). Participants joined the study between 2000 and 2002, categorising themselves into one of the four racial/ethnic groups. Participants underwent a "baseline" exam consisting of a standardised questionnaire and a series of medical tests.

Each of the seven baseline ICH metrics was scored as "poor", "intermediate", or "ideal" following AHA recommendations and taking into account any relevant medications such as those to control blood pressure or cholesterol. Points were then allocated with scores of 0 (poor or intermediate) or 1 (ideal) for each health behavior (diet, smoking, physical activity, BMI) and health factor (blood pressure, blood sugar, total cholesterol). Metrics were also grouped into categories of "poor" (0-1 attained), "intermediate" (2-3), and "ideal" (4+) levels of overall cardiovascular health. These scores were then compared with incident diabetes rates as well as population characteristics including race/ethnicity, age, and sex in order uncover any possible interactions.

The authors state that: "Our study showed that increasing levels of ideal cardiovascular health within the guidelines set out by the AHA 2020

impact goals may reduce the burden of diabetes in the US." Only one in four study participants were found to have attained four or more of the ICH components and among racial/ethnic minorities, this proportion was just one in six. These differences were not solely limited to lifestyle factors such as tobacco use or physical activity. HA and AA participants were found to have significantly higher BMI, systolic blood pressure and fasting glucose compared to NHWs.

Rates of incident diabetes developed during the follow-up period of the study were highest in HA and AA populations at 15.3 and 12.3 cases per 1000 people per year respectively, compared to 11.1 cases per 1000 person-years in the study population as a whole. CA had diabetes rates of 11.6 cases and NHW 8.3 cases per 1000 people per year. Every ICH goal that was achieved in both the cohort as a whole as well as the individual race/ethnic groups resulted in lower rates of incident diabetes. Participants categorised as having "intermediate" or "ideal" cardiovascular health had a 34% and 75% lower diabetes incidence, respectively, than individuals whose cardiovascular health was considered to be "poor".

In addition, the study discovered that the relationship between ICH components at baseline and diabetes risk varied significantly by race/ethnicity. The authors found that: "ideal vs poor cardiovascular health was associated with a greater reduction in diabetes risk in NHW and CA (87% and 88%) vs AA and HA (66% and 50%)." They propose that: "The lower prevalence of ICH, combined with lower magnitude of diabetes risk reduction with ICH in AA and HA, provides a potential explanation and intervention target for the disparities in diabetes prevalence among these groups."

They add: "Overall, three out of five cases of diabetes in this middle-age population appeared attributable to not having ICH at baseline and if these associations are causal could be prevented by attainment of at least four ICH components."

Furthermore, while diabetes rates have plateaued within the white American population as a result of 30 years of public health interventions, they have continued to rise within the AA and HA communities. The study's findings support the continued promotion of the AHA 2020 impact goals to lower diabetes among all races/ethnicities, but illustrate the particular importance of tailoring health messages and interventions to tackle the increased burden of diabetes in racial/ethnic minority populations.

The authors conclude: "Given the racial/ethnic differences in attainment of ICH, the lower magnitude of risk reduction with ICH and the increased burden of diabetes in racial/ethnic minorities, further research on promotion, attainment and ethnic differences of ICH in US racial/ethnic minority groups is of paramount importance to lower risk of cardiovascular disease and diabetes."

More information: Joshua J. Joseph et al. The association of ideal cardiovascular health with incident type 2 diabetes mellitus: the Multi-Ethnic Study of Atherosclerosis, *Diabetologia* (2016). DOI: 10.1007/s00125-016-4003-7

Provided by Diabetologia

APA citation: Study finds targeting 'ideal cardiovascular health' lowers diabetes risk, but with ethnic differences (2016, June 8) retrieved 30 April 2021 from https://medicalxpress.com/news/2016-06-ideal-cardiovascular-health-lowers-diabetes.html

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