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Original article

Cardiovascular risk assessment in elderly adults using SCORE OP model in a Latin American population: The experience from Ecuador☆

Ivan Sisa[a,b]

[a] Colegio de Ciencias de la Salud, Escuela de Medicina, Universidad San Francisco de Quito (USFQ), Quito, Ecuador
[b] Clinical and Translational Science Graduate Program, Sackler School of Graduate Biomedical Sciences, Tufts Clinical and Translational Science Institute, Tufts University, Boston, MA, United States

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ABSTRACT

Introduction and objective: Cardiovascular disease (CVD) mortality is predicted to increase in Latin America countries due to their rapidly aging population. However, there is very little information about CVD risk assessment as a primary preventive measure in this high-risk population.
Material and methods: We predicted the national risk of developing CVD in Ecuadorian elderly population using the Systematic COronary Risk Evaluation in Older Persons (SCORE OP) High and Low models by risk categories/CVD risk region in 2009. Data on national cardiovascular risk factors were obtained from the *Encuesta sobre Salud, Bienestar y Envejecimiento*. We computed the predicted 5-year risk of CVD risk and compared the extent of agreement and reclassification in stratifying high-risk individuals between SCORE OP High and Low models. Analyses were done by risk categories, CVD risk region, and sex.
Results: In 2009, based on SCORE OP Low model almost 42% of elderly adults living in Ecuador were at high risk of suffering CVD over a 5-year period. The extent of agreement between SCORE OP High and Low risk prediction models was moderate (Cohen's kappa test of 0.5), 34% of individuals approximately were reclassified into different risk categories and a third of the population would benefit from a pharmacologic intervention to reduce the CVD risk.
Conclusions: Forty-two percent of elderly Ecuadorians were at high risk of suffering CVD over a 5-year period, indicating an urgent need to tailor primary preventive measures for this vulnerable and high-risk population.

Evaluación del riesgo cardiovascular en adultos mayores utilizando el modelo SCORE OP en una población latinoamericana: experiencia en Ecuador

Palabras clave:
Enfermedad cardiovascular
Evaluación de riesgo
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RESUMEN

Introducción y objetivo: La mortalidad por enfermedad cardiovascular (ECV) se incrementará en América Latina debido al rápido envejecimiento de su población. Sin embargo, existe poca información sobre la evaluación del riesgo de ECV como medida de prevención primaria en este grupo de alto riesgo.
Material y métodos: Se predijo el riesgo nacional de desarrollar ECV en la población adulta mayor ecuatoriana utilizando los modelos *Systematic COronary Risk Evaluation in Older Persons* (SCORE OP) *High* y *Low*, por categorías de riesgo y región en el año 2009. Se obtuvieron datos nacionales sobre factores de riesgo cardiovascular de la Encuesta sobre Salud, Bienestar y Envejecimiento. Se calculó el riesgo a 5 años de desarrollar ECV y comparamos el grado de concordancia/reclasificación entre modelos SCORE OP *High* y *Low* para estratificar a los individuos con alto riesgo. Se realizaron análisis por categoría de riesgo, región y sexo.

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E-mail address: isisa@usfq.edu.ec

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Resultados: En 2009, según SCORE OP *Low*, aproximadamente el 42% de los adultos mayores en Ecuador tuvieron un alto riesgo de presentar ECV en un período de 5 años. El grado de concordancia entre los modelos de predicción SCORE OP *High* y *Low* fue moderado (prueba de kappa: 0,5), alrededor del 34% de los individuos fueron reclasificados en diferente categoría de riesgo y un tercio de la población se hubiera beneficiado de una intervención farmacológica para reducir el riesgo de ECV.
Conclusiones: El 42% de la población adulta mayor ecuatoriana tuvo un alto riesgo de presentar ECV en un período de 5 años, mostrando una urgente necesidad de intervención de prevención primaria en esta población vulnerable de alto riesgo.

Introduction

Over recent decades, the Latin America (LA) countries have achieved a fast reduction in the prevalence of communicable diseases and malnutrition.[1] As a result of that, their health care systems are currently facing with an increase in the aged population and in the burden of cardiovascular disease (CVD) such as coronary heart disease and stroke.[2] Currently, CVD is the leading cause of disability and death in LA countries.[3] It is predicted that the death rate from CVD will be increased markedly in these countries due to their rapidly aging population.[4,5] However, despite this expected disease burden, there is very little information regarding elderly health,[6,7] and in particular about the CVD risk assessment as a primary preventive measure in this high-risk population.

Currently, there are several models available to predict the risk of CVD occurring over a 5- to 10-year period.[8] But, these models were built mostly in middle-aged population and thus, they tend to overestimate the CVD risk among the elderly.[9,10] Recently, a risk estimation function, which can be used in the 65 years and older population, was derived and validated. The risk estimation function came from the cohort of 4 prospective European studies of elderly adults named as Systematic COronary Risk Evaluation in Older Persons (SCORE O.P).[11] In addition, SCORE O.P accounts for the age-adjusted CVD mortality rate in a country.[11,12] Thus, it provides two models depend on whether a country is considered as High or Low cardiovascular risk region. These two models are named SCORE O.P-High and SCORE O.P-Low, respectively.

There presently does not exist data about the risk of CVD among the elderly population of Ecuador. The aim of this study was to describe the risk of CVD among Ecuadorian elderly population, and compared the extent of agreement and reclassification in stratifying high-risk individuals using SCORE O.P models. This cross-sectional analysis was conducted using de-identified data from a national survey about the health and well-being of elderly people in Ecuador.

Methods

Setting and dataset

The geographic setting of this study is the country of Ecuador. With a population of approximately 16 million (70% urban), the country is ethnically and racially diverse, comprised of approximately 7% Indigenous, 7% black (or Afro-Ecuadorians), 79% mixed and 6% white.[13] In 2009, the Ecuadorian government conducted a cross-sectional national survey in urban and rural areas in the highland and coastal regions of Ecuador. The de-identified survey entitled Encuesta sobre Salud, Bienestar y Envejecimiento (SABE-ECU—Survey of Health, Wellbeing and Aging), investigated the health and well-being of elderly people, based on a representative sample (n = 5235) of persons aged from 60 years and older.[14]

A probabilistic and population-proportionate sample of households was used to obtain the sample and the survey response rate was 97%.[15] The modules included in the survey asked questions about demographic and household characteristics; self-reported health and chronic conditions; in person assessment anthropometric measures and blood pressure; mobility status, abuse and cognitive states; use and access of health services; medication use; family and social support; labor force and retirement; and venous blood specimens were collected for biomarkers. Details of the study and the measurement of health care characteristics has been described elsewhere.[14]

SCORE O.P model and design

Using data from four prospective European studies (Denmark, Italy, Belgium and Norway) of 20,704 men and 20,121 women, 65 years and older, without pre-existing coronary disease a risk estimation function SCORE O.P was developed for use in older individuals and showed good discrimination and calibration.[11] The SCORE O.P risk assessment model estimates 5 or 10-year risk of cardiovascular disease risk by combining two separate risk estimations: a model for coronary heart disease and a model for all non-coronary atherosclerotic CVD.[12] Furthermore, it allows an estimation of CVD according to sex and whether a country is considered to be a high or low cardiovascular risk region.[11] According to the European Society of Cardiology and European Atherosclerosis Society (ESC/EAS), a country is considered to be a "low CVD risk region" when its age-adjusted CVD mortality rate is <225/100,000 in men and <175/100,000 in women; countries with a CVD mortality rate more than double the cut-off of low-risk countries are considered to be a "high CVD risk region" (16). Based on the ESC/EAS guidelines and WHO statistics Ecuador would be considered as a low CVD risk region.[17]

We chose the SCORE O.P risk assessment model due to its accuracy in risk estimation in older people, as well its practicality and feasibility to be implemented at a community level in a low resource setting. The SCORE O.P model utilizes the major risk factors of age, sex, systolic blood pressure, total cholesterol, HDL-cholesterol, smoking status, and diabetes in estimating one's risk of developing CVD. In brief, a Cox proportional hazards model was used to derive a function and gender specific beta coefficients.[11] The model stratifies cardiovascular risk into four categories: low (<1%), moderate (1–5%), high (5–10%), and very high (>10%) 5 or 10-year risk of CVD related mortality.[11,16]

We conducted a cross-sectional study to calculate the predicted 5-year risk of developing CVD in this elderly population using the model equation and regression coefficients as described elsewhere.[11] Furthermore, this calculation was performed considering whether Ecuador is a high or low CVD risk region using the SCORE O.P-High and SCORE O.P-Low models, respectively.

Statistical analysis

Descriptive statistics were used to summarize the baseline characteristics of study participants. Continuous variables are described as mean ± SD or median (IQR), and categorical variables, as counts and percentages. We evaluated the extend of agreement between