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Original Article

Comparison of 3 risk estimators to guide initiation of statin therapy for primary prevention of cardiovascular disease

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KEYWORDS:
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BACKGROUND: Among high-risk individuals, statins are beneficial for primary prevention of cardiovascular disease (CVD). In Nigeria, currently, there are no CVD prevention guidelines, so the use of CVD risk estimation to guide statin therapy is left to the discretion of the physician.

OBJECTIVE: The objective of the study was to compare 3 CVD risk estimation tools in the evaluation of patients presenting to a tertiary hospital in Nigeria.

METHODS: Cross-sectional study involving 295 patients with any CVD risk factors but not taking statins. Traditional CVD risk factors were assessed with a standard questionnaire and laboratory evaluation. Ten-year CVD risk was estimated with American College of Cardiology/American Heart Association Atherosclerotic Cardiovascular Disease (ACC/AHA ASCVD) Risk Estimator (2013), Framingham Risk Score (Framingham Risk Score [FRS] 2008), and the World Health Organisation/International Society of Hypertension (WHO/ISH) risk prediction chart for Africa Region D. Kappa statistic was used to determine agreement among the estimators.

RESULTS: The mean age was 48.4 ± 10.4 years; 60.7% were females. Risk factors for CVD were hypertension (56.3%), dyslipidemia (41.4%), diabetes (20%), obesity (28.5%), and cigarette smoking (4.4%). In all, 50.2%, 16.9%, and 15.2% were classified as high risk using the ACC/AHA ASCVD Risk Estimator, FRS 2008, and WHO/ISH risk chart, respectively. The agreement was moderate between FRS and WHO/ISH (Kappa 0.414, $P < .001$) and fair between ACC/AHA Estimator and WHO/ISH (Kappa 0.223, $P < .001$) and between ACC/AHA Estimator and FRS (Kappa 0.301, $P < .001$).

CONCLUSIONS: The considerable variation in prediction of high risk using the 3 tools may lead to underutilization of evidence-based therapy. This underscores the dire need for the development of risk prediction tools derived from our own Nigerian population.

Introduction

Cardiovascular disease (CVD) is the leading cause of death in developed countries and is a growing epidemic in sub-Saharan Africa.[1] In 2015, the World Health Organization (WHO) report stated that CVD caused 17.5 million deaths annually with 82% of these occurring in low- and

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middle-income countries.[2] In countries in sub-Saharan Africa faced with the double burden of communicable and noncommunicable diseases, the emphasis with regards to decreasing the impact of CVD on the populace should be on prevention.

Prevention can be at the population or patient level. At the patient level, the high-risk strategy is advocated where individuals who on the basis of a constellation of risk factors are considered to be at high total risk of developing CVD in the short term (10 years) are targeted for preventive treatment for primary prevention of CVD.[3] Preventive treatment consists of a combination of adoption of healthy lifestyle behaviors and pharmacotherapy. One of the most potent CVD risk reduction agents are statins. Statin therapy has been shown in several well-conducted large representative randomized controlled trials to reduce the risk of CVD among various populations.[4] In cholesterol biosynthesis, an enzyme which catalyzes the rate limiting step is the 3-hydroxy 3-methyglutaryl coenzyme A reductase. This enzyme is inhibited by statins. The higher the dose/intensity of the statin the more the low-density lipoprotein cholesterol (LDL-C) reduction and this translates into cardiovascular benefit. For every 1 mmol/L reduction in LDL-C with a statin, the risk of CVD reduces by 20% to 25%.[4] To determine which individuals will benefit from such therapy, however, their absolute risk of developing CVD has to be known. This can be estimated with the aid of risk estimators that have been derived from large cohorts. The best risk estimator to use is that, which is derived from the population in which it is to be applied. In Nigeria, no such population-derived data are available, so physicians who want to estimate CVD risk have to rely on estimators derived from mostly Western populations. These may not be applicable among Nigerian patients as the cohorts from which they were derived may differ in some respects.

In the present study, a cross-section of individuals who were seen in the medical and general outpatient clinics of a busy teaching hospital who have CVD risk factors was evaluated and their 10-year CVD risk was estimated using 3 different CVD risk estimators. The aim of this study was to compare the risk estimators in their ability to classify patients as high risk and thus requiring preventive measures including lifestyle modification advise and potentially statin therapy.

Subjects and methods

The participants in this study were drawn from patients attending the medical out-patient and general outpatient clinics of the University of Port Harcourt Teaching Hospital Rivers state over a 1-year period (June 2015–May 2016). The University of Port Harcourt Teaching Hospital is a tertiary health facility in Port Harcourt, a metropolitan city in the South-South region of Nigeria. The hospital caters to the neighboring communities as well as receives referrals from health centers in the surrounding states of Bayelsa, Abia, and Imo. Purposive sampling was done as every consecutive patient who met the inclusion criteria was asked to participate in the study. The minimum sample size of patients required for the study was 276 allowing for 20% noncompletion rate. It was calculated using the formula $n = z^2pq/d^2$ where "n" is the desired sample size; z is the standard normal deviation, usually set at 1.96, which corresponds to the 95% confidence level; p = proportion of likely patients in the population with hypertension (the most prevalent CVD risk factor), estimated at 18.3%[5] and q is 1.0; $P = 81.7\%$.

The participants who were recruited met the following inclusion criteria:

- Individuals aged 30 to 75 years of age who gave informed consent.
- Patients with hypertension who were on treatment with antihypertensive drugs or those not on treatment but with averaged clinic BP more than or equal to 140/90 mm Hg and not taking statin therapy.
- Patients with deranged lipid profile who were not yet on lipid-lowering agents.
- Patients recently diagnosed with diabetes within the past 3 years and on treatment with diet, oral hypoglycemic drugs and/or insulin, and not taking statin therapy.

Exclusion criteria included

- Individuals aged <30 or >75 years.
- Those who did not give informed consent.
- Any patient on statin therapy already.
- Severe comorbidities that was likely to affect participation such as severe heart failure, severe physical disability, or dementia.

Ethical approval was obtained from the University of Port Harcourt Teaching Hospital ethics committee.

Sociodemographic, medical history and lifestyle habits were obtained from recruited persons who gave informed consent using a questionnaire constructed for this study. The participants were then examined and anthropometric measurements were taken. Weight and height were measured to the nearest 0.5 kg and 0.1 cm, respectively, with a Seca stadiometer scale. The participant was made to stand on the scale feet together, without shoes or head gear, back and heel together against a vertical ruled bar to which a movable attached horizontal bar was brought to the vertex of the head before the readings were taken. The body mass index (BMI) in kilogram per square meter was used as an index of obesity. Those with a BMI >30 kg/m^2 were considered to be obese. Blood pressure was measured with a standard (Accosson) mercury sphygmomanometer (cuff size 12.5 × 40 cm) on the patients' right arm in the seated position with feet on the floor after a 5-minute rest. Systolic and diastolic blood pressures were taken at Korotkoff phases 1 and 5, respectively, to the nearest 2 mm Hg. A patient was classified as hypertensive if they were already on antihypertensive medication or if the average of 2 measured seated blood pressures in the clinic was ≥140/90 mm Hg on 2 occasions at least 6 hours apart.