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Original article

Cardiovascular risk prediction in chronic kidney disease patients☆

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ABSTRACT

Introduction: Scores underestimate the prediction of cardiovascular risk (CVR) as they are not validated in patients with chronic kidney disease (CKD). Two of the most commonly used scores are the Framingham Risk Score (FRS-CVD) and the ASCVD (AHA/ACC 2013). The aim of this study is to evaluate the predictive ability of experiencing a cardiovascular event (CVE) via these 2 scores in the CKD population.

Material and methods: Prospective, observational study of 400 prevalent patients with CKD (stages 1–4 according the KDOQI; not on dialysis). Cardiovascular risk was calculated according to the 2 scores and the predictive capacity of cardiovascular events (atherosclerotic events:myocardial infarction, ischaemic and haemorrhagic stroke, peripheral vascular disease; and non-atherosclerotic events: heart failure) was analysed.

Results: Forty-nine atherosclerotic cardiovascular events occurred in 40.3 ± 6.6 months of follow-up. Most of the patients were classified as high CVR by both scores (59% by the FRS-CVD and 75% by the ASCVD). All cardiovascular events occurred in the high CVR patients and both scores (FRS-CVD log-rank 12.2, $P < 0.001$, HR 3.1 [95% CI: 1.3–7.1] P: 0.006 and ASCVD log-rank 8.5 $P < 0.001$, HR 3.2 [95% CI: 1.1–9.4] P: 0.03) were independent predictors adjusted to renal function, albuminuria and previous cardiovascular events.

Conclusion: The cardiovascular risk scores (FRS-CVD and ASCVD [AHA/ACC 2013]) can estimate the probability of atherosclerotic cardiovascular events in patients with CKD regardless of renal function, albuminuria and previous cardiovascular events.

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Predicción del riesgo cardiovascular en pacientes con enfermedad renal crónica

Palabras clave:
Enfermedad renal crónica
Riesgo cardiovascular
Escala de riesgo cardiovascular
FRS-CVD
ASCVD

RESUMEN

Introducción: Las escalas de predicción del riesgo cardiovascular (RCV) suelen infraestimar el riesgo, al no estar validadas en población con enfermedad renal crónica (ERC). Dos de las más empleadas son la clásica escala de Framingham (FRS-CVD) y la contemporánea ASCVD (AHA/ACC 2013). El objetivo del estudio es evaluar la capacidad predictiva de sufrir un evento cardiovascular (ECV) mediante estas 2 escalas en población con ERC.

Material y métodos: Estudio observacional prospectivo de 400 pacientes prevalentes con ERC (estadios 1-4 según KDOQI, no en diálisis). Se calculó el RCV según las 2 escalas y se analizó su poder predictivo de ECV ateroscleróticos (infarto agudo de miocardio, evento cerebro vascular isquémico y hemorrágico, enfermedad vascular periférica) y no ateroscleróticos (insuficiencia cardíaca).

Resultados: Con una media de seguimiento de 40,3 ± 6,6 meses se registraron 49 ECV ateroscleróticos. Ambas escalas clasificaron a la mayoría de los pacientes en el grupo de alto RCV (59% según FRS-CVD y 75% según ASCVD). Todos los ECV sucedieron en el grupo de alto RCV, y ambas escalas (FRS-CVD *log rank:* 12,2; p < 0,001; HR 3,1 [IC 95%: 1,3-7,1]; p: 0,006 y ASCVD *log rank:* 8,5 p < 0,001; HR 3,2 [IC 95% 1,1-9,4] p: 0,03) fueron predictores independientes ajustados a función renal, albuminuria y antecedente de ECV.

Conclusiones: Las escalas de predicción de RCV (FRS-CVD y ASCVD [AHA/ACC 2013]) pueden estimar la probabilidad de sufrir ECV ateroscleróticos en pacientes con ERC independientemente de la función renal, albuminuria y antecedente de ECV.

Introduction

There are several scores to predict likelihood of experiencing a cardiovascular event (CVE) in 10 years.[1–3] One of these is the classic Framingham score, initially validated in 1998 to predict CVEs: coronary death, non-fatal acute myocardial infarction (AMI), and stable and unstable angina.[4,5] It was revised in 2002 by the Third Adult Treatment Panel (ATP)[6] and again in 2008.[7] It has been validated since then to predict atherosclerotic (fatal and non-fatal AMI, angina or coronary heart disease, fatal and non-fatal ischaemic/haemorrhagic stroke, transient ischaemic attack, intermittent claudication) and non-atherosclerotic (heart failure) CVEs.[7] The Framingham equation is based on an homogeneous, geographically limited and predominantly white population, and consequently its use in modern cohorts has been widely questioned.[8,9] However, the American College of Cardiology (ACC) and the American Heart Association (AHA) have recently developed the Atherosclerotic Cardiovascular Disease (ASCVD) risk algorithm.[10] This new instrument has been validated in a multiracial sample (Multi-Ethnic Study of Atherosclerosis, MESA), and is designed to predict atherosclerotic CVEs (fatal and non-fatal AMI, and fatal and non-fatal strokes); it has also been validated for the African-American population.[10–13]

Chronic kidney disease (CKD) is a powerful predictor of CVEs.[14,15] This is be explained by the high prevalence of traditional risk factors, as well as those intrinsically related with CKD (non-traditional).[16–18]

Cardiovascular risk (CVR) prediction scores do not usually include factors specific to CKD within their variables.[7,10] Nevertheless, various studies have failed to demonstrate that adding these CKD-specific variables implies a significant increase in prediction terms.[19]

One of the great criticisms of CVR prediction scores is their capacity to "overestimate" risk,[8] and their poor discriminatory power in the CKD population.[20] However, there is currently no equation that is accurate enough to estimate CVR in both the general population and in patients with CKD.[8,20,21]

The aim of this study is to evaluate the power of two scores to predict the risk of presenting a CVE: the Framingham Risk Score Cardiovascular Disease (FRS-CVD) and the ASVCD (ACC/AHA 2013) in patients with CKD, and to analyse the effect of renal function in prediction terms.

Materials and methods

A prospective, observational study was conducted to evaluate the ability to predict CVE risk using CVR prediction scores: FRS-CVD and ASCVD (ACC/AHA 2013) in patients with CKD. The study included a cohort of 400 consecutive CKD patients, seen in outpatient Nephrology departments. The inclusion criteria were: age 40–79 years, with CKD stage 1–4 (not on dialysis), in accordance with the Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines.[22] The exclusion criteria were recent hospitalisation (last 4 months) and refusal to participate in the study.