Rev Port Cardiol. 2015;34(4):247–253

Revista Portuguesa de Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

ORIGINAL ARTICLE

Performance of traditional risk factors in identifying a higher than expected coronary atherosclerotic burden

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Received 2 August 2014; accepted 16 August 2014
Available online 3 April 2015

KEYWORDS
Atherosclerotic burden;
Risk factor;
Attributable risk;
Calcium score;
CT angiography

Abstract
Objective: To evaluate the performance of traditional cardiovascular (CV) risk factors in identifying a higher than expected coronary atherosclerotic burden.
Methods: We assessed 2069 patients undergoing coronary CT angiography, with assessment of calcium score (CS), for suspected coronary artery disease. A higher than expected atherosclerotic burden was defined as CS >75th percentile (CS >P75) according to age and gender-adjusted monograms. The ability of traditional CV risk factors to predict a CS >P75 was assessed in a customized logistic regression model (''Clinical Score'') and by the calculation of SCORE (Systemic Coronary Risk Evaluation). The population attributable risk (PAR) of risk factors for CS >P75 was calculated.
Results: The median CS was 3.0 (IQR 0.0–98.0); 362 patients had CS >P75. The median SCORE was 3.0 (IQR 1.0–4.0). With the exception of hypertension, all traditional CV risk factors were independent predictors of CS >P75: diabetes, dyslipidemia, smoking and family history (OR 1.3–2.2, $p \leq 0.026$). The areas under the ROC curves for CS >P75 were 0.64 for the Clinical Score (95% CI 0.61–0.67, $p<0.001$) and 0.53 for SCORE (95% CI 0.50–0.56, $p=0.088$). About a quarter of patients with CS >P75 were in the two lower quartiles of the Clinical Score. Altogether, the traditional risk factors explain 56% of the prevalence of CS >P75 (adjusted PAR 0.56).

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http://dx.doi.org/10.1016/j.repc.2014.08.030

Conclusion: Despite the association of CV risk factors with a higher than expected atherosclerotic burden, they appear to explain only half of its prevalence. Even when integrated in scores, the predictive power of these risk factors was modest, exposing the limitations of risk stratification based solely on demographic and clinical risk factors.

PALAVRAS-CHAVE
Carga Aterosclerótica;
Fator de risco;
Score de cálcio;
AngioTC

Desempenho dos fatores de risco clássicos na identificação de uma carga aterosclerótica coronária superior ao esperado

Resumo
Objetivo: O objetivo deste trabalho foi avaliar o desempenho dos fatores de risco cardiovascular (CV) clássicos na identificação de carga aterosclerótica superior ao esperado.
Métodos: Avaliámos 2069 doentes (dts) que realizaram AngioTC cardíaca e ScCa para exclusão de doença coronária. Definiu-se carga aterosclerótica superior ao esperado um ScCa acima do percentil 75 (ScCa>p75) de acordo com nomogramas ajustados para o sexo e idade. A capacidade dos fatores de risco clássicos preverem ScCa>p75 avaliou-se num modelo de regressão logística customizado (*score* clínico) e pelo SCORE. Avaliou-se o Population Attributable Risk (PAR) dos fatores de risco para ScCa>p75.
Resultados: A mediana de ScCa foi 3,0 [IIQ 0,0-98,0]; 362 dts com ScCa>p75. A mediana do HeartScore foi 3,0 [IIQ 1,0-4,0]. Exceto a hipertensão arterial, todos os fatores de risco foram preditores independentes de CaSc>p75: diabetes *mellitus*, dislipidemia, tabagismo e história familiar (OR 1,3-2,2, p≤0,026). As áreas abaixo da curva ROC para SaCa>p75 foram 0,64 para *score* clínico (IC95% 0,61-0,67; p<0,001) e 0,53 para SCORE (IC95% 0,50-0,56, p=0,088). Um quarto dos dts com CaSc>p75 encontravam-se nos dois quartis de *score* clínico mais baixos. No seu conjunto, os fatores de risco clássicos explicam 56% da prevalência de ScCa>p75 (PAR ajustado 0,56).
Conclusão: Apesar de os fatores de risco CV se associarem a uma carga aterosclerótica superior ao esperado, justificam pouco mais de metade da sua prevalência. O poder preditor destes fatores de risco é modesto, mesmo integrados em *scores*, revelando as limitações da estratificação de risco baseada apenas em dados demográficos e fatores de risco clínicos.

Introduction

Coronary artery disease (CAD) remains the single most frequent cause of premature mortality worldwide, reaching epidemic proportions.[1] Primary prevention measures have had a favorable effect on the prognosis of patients with CAD. Estimation of total cardiovascular (CV) risk is a cornerstone of the assessment of patients with suspected CAD, enabling adjustment of the intensity of preventive and therapeutic measures.[2] Risk scores that reflect the interaction of multiple CV risk factors are available for this purpose and are frequently used in clinical practice.

Although modifiable CV risk factors account for most of the risk of myocardial infarction (MI), risk prediction based on scores including only demographic and clinical characteristics have some limitations.[3] The MONICA project[4] showed that only part of the variation in the time trends of coronary event rates could be predicted by trends in risk factors. In fact, CV risk can be higher than indicated by the charts in several settings, for example in asymptomatic individuals with preclinical evidence of atherosclerosis, such as the presence of calcified coronary plaques.

The extent of coronary calcification correlates with total coronary plaque burden, and has a high negative predictive value for ruling out the presence of significant coronary stenosis.[5,6] Additionally, the calcium score (CS) also has a prognostic impact, as it can show increased risk of MI.[7,8] In previous studies, the CS was a predictor for premature CAD independently of traditional clinical CV risk factors, and combining the two appears to change the predicted risk to an extent that may be clinically important, helping to decide how aggressively primary prevention strategies should be implemented.[9,10]

The aim of the present study was to assess the performance of the traditional CV risk factors, alone or associated in scores, in identifying a higher than expected coronary atherosclerotic burden.

Methods

Study design and population

Between February 2007 and September 2012, 3012 consecutive patients undergoing coronary computed tomography