

Original article

Educational Level and Long-term Mortality in Patients With Acute Myocardial Infarction



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Article history:

Received 21 July 2014

Accepted 26 November 2014

Available online 16 April 2015

Keywords:

Myocardial infarction

Educational level

Prognosis

Socioeconomic status

ABSTRACT

Introduction and objectives: The value of socioeconomic status as a prognostic marker in acute myocardial infarction is controversial. The aim of this study was to evaluate the impact of educational level, as a marker of socioeconomic status, on the prognosis of long-term survival after acute myocardial infarction.

Methods: We conducted a prospective, observational study of 5797 patients admitted to hospital with acute myocardial infarction. We studied long-term all-cause mortality (median 8.5 years) using adjusted regression models.

Results: We found that 73.1% of patients had primary school education (n = 4240), 14.5% had secondary school education (including high school) (n = 843), 7.0% was illiterate (n = 407), and 5.3% had higher education (n = 307). Patients with secondary school or higher education were significantly younger, more were male, and they had fewer risk factors and comorbidity. These patients arrived sooner at hospital and had less severe heart failure. During admission they received more reperfusion therapy and their crude mortality was lower. Their drug treatment in hospital and at discharge followed guideline recommendations more closely. On multivariate analysis, secondary school or higher education was an independent predictor and protective factor for long-term mortality (hazard ratio = 0.85; 95% confidence interval, 0.74-0.98).

Conclusions: Our study shows an inverse and independent relationship between educational level and long-term mortality in patients with acute myocardial infarction.

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Nivel de estudios y mortalidad a largo plazo en pacientes con infarto agudo de miocardio

RESUMEN

Introducción y objetivos: Existe controversia acerca del valor del nivel socioeconómico como marcador pronóstico en el infarto agudo de miocardio. El objetivo de este estudio fue evaluar el impacto del nivel de estudios, como marcador del estatus socioeconómico, sobre el pronóstico vital a largo plazo tras un infarto agudo de miocardio.

Métodos: Estudio prospectivo y observacional de 5.797 pacientes hospitalizados por un infarto agudo de miocardio. Se estudió la mortalidad por todas las causas a largo plazo (mediana 8,5 años) mediante modelos de regresión ajustados.

Resultados: Un 73,1% de los pacientes había cursado estudios primarios (n = 4.240), los segundos más frecuentes fueron los estudios medios (secundaria, bachiller) (n = 843; 14,5%). Un 7,0% (n = 407) era analfabeto y el 5,3% tenía estudios superiores (n = 307). Los pacientes con un nivel de estudios medio o superior fueron significativamente más jóvenes, en mayor proporción varones y presentaban menos factores de riesgo y comorbilidad. Eran pacientes que acudían antes al hospital y se presentaban con menor grado de insuficiencia cardíaca. Durante el ingreso recibieron con más frecuencia terapia de reperusión y su mortalidad cruda fue inferior. El tratamiento hospitalario y al alta incluyó más fármacos recomendados por las guías. En un contexto multivariado, el nivel de estudios medio o superior se mostró como un predictor independiente y protector respecto de la mortalidad a largo plazo (hazard ratio = 0,85; intervalo de confianza del 95%, 0,74-0,98).

Palabras clave:

Infarto de miocardio

Nivel de estudios

Pronóstico

Nivel socioeconómico

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<http://dx.doi.org/10.1016/j.rec.2015.06.018>, Rev Esp Cardiol. 2015;68:1039.

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<http://dx.doi.org/10.1016/j.rec.2014.11.025>

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Conclusiones: Este estudio muestra una relación inversa e independiente entre el nivel de estudios previos y la mortalidad a largo plazo en pacientes que han experimentado un infarto agudo de miocardio. © 2014 Sociedad Española de Cardiología. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Abbreviations

AMI: acute myocardial infarction

INTRODUCTION

Advances in the management of coronary artery disease have led to an overall improvement in treatment and prognosis.¹ However, the high cost of these measures means that their impact is observed in more developed countries, with marked differences compared with all other countries.² Furthermore, the greatest burden of coronary artery disease and associated mortality is focused in poor countries, where lower socioeconomic classes are a majority.³ This imbalance is partly caused by a higher prevalence of vascular risk factors,⁴ but it may also be caused by differences in level of health care, and in particular by less diagnostic testing, fewer coronary interventions and less use of evidence-based medicine.^{5,6} However, the mechanisms underlying the association between lower socioeconomic status and poor prognosis have not been fully elucidated. Within the field of socioeconomic status, which is multidimensional and complex, the scientific community has placed great interest on educational level as a secondary or intermediate marker, because it is related to the socioeconomic status of parents and income, which in turn contribute to an individual's social position.⁷ This educational level is closely linked to occupational class and sex.⁷

Furthermore, coronary risk stratification has been based traditionally on scales with biological variables alone, and little attention has been paid to psychosocial factors such as educational level. These factors could be important because every aspect of a patient would be considered.⁸ Findings in other countries suggest that evaluating educational level could provide a relevant prognostic factor in patients with acute myocardial infarction (AMI).^{4,9–11} Some studies in our setting have analyzed the relationship between socioeconomic status and AMI risk,¹² in-hospital treatment,¹³ and quality of life.¹⁴

The taxpayer-funded public health system in Spain ensures universal access, in theory at least, to medical and health services. This should provide a suitable scenario to assess the relationship between educational level and prognosis.

The objective of our study was to analyze the long-term prognostic impact of educational level in patients admitted to our heart unit after an AMI.

METHODS

Recruitment

We recruited all patients with AMI seen within 24 hours of symptom onset and admitted to the coronary care unit between January 1998 and March 2008 at 2 hospitals in the Region of Murcia: *Hospital Universitario Virgen de la Arrixaca* (Murcia) and *Hospital Universitario de Santa Lucía* (Cartagena). The diagnosis of AMI was established if 2 of the following conditions were met: characteristic precordial pain lasting > 30 min, ST-segment

elevation or depression in 2 contiguous leads, and creatine kinase MB fraction at least twice the upper reference limit. On admission, the AMI was classified as ST-segment elevation, non-ST-segment elevation, or indeterminate location with left bundle-branch block or pacemaker. Acute myocardial infarction with ST-segment elevation was established if there was presumed-new ST-segment elevation in ≥ 2 precordial leads measuring > 0.2 mm in V₁, V₂ or V₃ and > 0.1 mm in lateral leads (aVL, I) or inferior leads (II, III and aVF). Exclusion criteria were: a) refusal to sign the consent; b) > 24 hours since onset; c) infarction associated with coronary revascularization; d) myocardial infarction later confirmed to have other etiology (eg, severe anemia, arrhythmias, hypoxemia), and e) patients with unstable angina. The patients were enrolled in an observational, longitudinal, prospective study. The study was approved by the ethics committees at each participating site, and patients gave their written consent to participate in the registry.

Variables. General Definitions

We obtained detailed demographic data for each patient by means of an interview at the time of admission. "Major or severe bleeding complications" were defined as brain and retroperitoneal hemorrhages or bleeding at any other site leading to hemodynamic compromise and/or requiring a whole blood or blood product transfusion. "Reperfusion" was defined as any combination of fibrinolysis, primary angioplasty, next-day angioplasty after successful fibrinolysis, and other nonsurgical revascularization procedures. "Heart rupture" was defined as any combination of rupture of the free wall, ventricular septum or mitral chord.

Definition of Educational Level and Occupational Group

We used the following definitions for educational level: "illiterate" (no schooling), "primary education" (equivalent to elementary or junior school education); "secondary education" (equivalent to secondary or high school education), and "higher education" (university studies). We also defined the following occupational groups for this study: "unskilled" (jobs not requiring specific skills or knowledge), "housework" (domestic and family chores), "skilled" (jobs requiring specific, nonuniversity studies, including managerial positions) and "academic" (jobs filled by university graduates and postgraduates). The above educational and occupational classifications were specifically designed for this research study.

Follow-up

We followed up patients at discharge for a median 8.5 years by means of telephone contacts, follow-up at outpatient clinics, and reviews of medical records and death registries. We achieved a 98% follow-up rate.

Statistical Analysis

The relationship between dichotomous variables was studied using contingency tables and chi-square or Fisher's exact test, as appropriate. Quantitative variables were compared using an

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