

# Prevalence of Chronic Kidney Disease in Patients With or at a High Risk of Cardiovascular Disease

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This secondary analysis of data from the MULTIRISC study investigated the prevalence of chronic kidney disease (CKD) in patients who either had or were at a high risk of cardiovascular disease. The original, epidemiological, cross-sectional, multicenter study was carried out in outpatient clinics belonging to cardiology, internal medicine and endocrinology departments. It included patients aged  $\geq 18$  years with a high cardiovascular risk (ie, a SCORE [Systematic Coronary Risk Evaluation] risk  $> 5\%$  or diabetes mellitus or associated clinical disease). The definition of CKD was an estimated glomerular filtration rate (Modification of Diet in Renal Disease formula)  $< 60$  mL/min per  $1.73$  m<sup>2</sup>. Established CKD was regarded as present when, in addition, the serum creatinine level was  $\geq 1.3$  mg/dL in men or  $\geq 1.2$  mg/dL in women, and occult CKD as present when the creatinine level was lower. In total, 2608 patients were included. Some 62.7% did not have CKD, 18.9% had established CKD, and 18.4% had occult CKD. In summary, CKD was highly prevalent in patients with a high risk of cardiovascular disease.

**Key words:** Cardiovascular risk. Cardiovascular disease. Chronic kidney disease.

## Prevalencia de insuficiencia renal crónica en pacientes de alto riesgo o con enfermedad cardiovascular

Este subanálisis del estudio MULTIRISC evaluó la prevalencia de insuficiencia renal crónica (IRC) en pacientes con alto riesgo o enfermedad cardiovascular. Se trata de un estudio epidemiológico, transversal y multicéntrico realizado en consultas externas de cardiología, medicina interna o endocrinología. Se incluyó a pacientes con 18 años o más, con alto riesgo cardiovascular (SCORE  $> 5\%$  o diabetes o enfermedad clínica concomitante). Se definió IRC si el filtrado glomerular estimado (MDRD) era  $< 60$  ml/min/ $1,73$  m<sup>2</sup>; IRC establecida si además la creatinina era  $\geq 1,3$  mg/dl en varones o  $\geq 1,2$  mg/dl en mujeres, e IRC oculta cuando la creatinina era inferior. Se incluyó a 2.608 pacientes. El 62,7% no presentaba IRC, el 18,9% presentaba IRC establecida y el 18,4%, IRC oculta. La IRC es muy prevalente en pacientes con alto riesgo cardiovascular.

**Palabras clave:** Riesgo cardiovascular. Enfermedad cardiovascular. Enfermedad renal crónica.

## INTRODUCTION

Chronic kidney disease (CKD) is a major health care problem due to its associated high morbidity and mortality, increasing prevalence, and elevated

costs. A reduction in glomerular filtration rate (GFR) has been related with an increase in the risk of cardiovascular complications and greater morbidity and mortality.<sup>1,2</sup>

The rise in the prevalence of CKD in the western world can be explained by the progressive aging of the population and the increases in diabetes mellitus (DM), hypertension, and obesity. This has led to growing interest in determining the epidemiology of CKD in the general population, as well as in at-risk populations. The National Kidney Foundation KDOQI guidelines, as well as a recent declaration by the AHA, recommend calculating the estimated GFR (eGFR) in at-risk populations.<sup>3,4</sup> In addition, a consensus document has recently been published to

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implement the calculation of the eGFR in Spanish laboratories.<sup>5</sup>

Whilst the high prevalence of CKD is known in patients who either have or are at a high risk of having cardiovascular disease, information is lacking to confirm that this is also the case in those persons seen in the outpatient setting in Spain. This secondary analysis of the MULTIRISC study analyzed the prevalence of chronic renal failure (CRF) in a sample of stable patients either with or at a high risk for cardiovascular disease.

## METHODS

We undertook an epidemiological, cross-sectional multicenter study of patients aged over 18 years who had either a high cardiovascular risk or cardiovascular disease itself, seen in the outpatient clinics of cardiology, internal medicine or endocrinology services or those of other specialties. The participating physicians were selected randomly throughout the whole of Spain, and the study included 2608 patients (the first 6 consecutive patients seen by each participating researcher who fulfilled the selection criteria and who were willing to participate in the study). The distribution of the research physicians according to specialty was: cardiology (53.1%), internal medicine (34.2%), endocrinology (11%), and others (1.7%).

The inclusion criteria were: patients of either sex, older than 18 years of age, seen at the outpatient clinics of the main participating researchers and who had a high cardiovascular risk, as defined by a SCORE above 5%<sup>6</sup> (or else a risk  $\geq 20\%$  according to the Framingham criteria, a high or very high risk according to the criteria of the ESH/ESC 2007 guidelines or a high risk according to the criteria of the World Health Organization [WHO]) or DM, or concomitant clinical disease, and who agreed to participate in the study.

Data were collected during the study visit to the physician's outpatient clinic on biodemographic and anthropometric characteristics, as well as blood pressure, cardiovascular risk factors, target organ damage, concomitant clinical diseases, and laboratory data.

## Definitions

The eGFR was calculated from the abbreviated MDRD equation.<sup>7</sup> CRF was defined as an eGFR  $< 60$  mL/min/1.73 m<sup>2</sup>. The KDOQI guidelines classification was used to define the stages of CKD.<sup>3</sup> Established CRF was defined, following the criteria of the ESC-ESH 2007 guidelines, as an eGFR  $< 60$  mL/min/1.73 m<sup>2</sup> and serum creatinine  $\geq 1.3$  mg/dL in men and serum creatinine  $\geq 1.2$  mg/dL in women,<sup>8</sup> and

occult CRF when the eGFR was  $< 60$  mL/min/1.73 m<sup>2</sup> but the creatinine figures were lower.

## Statistical Analysis

The analysis was based on the data from all the patients who could be evaluated, ie, all those who fulfilled the selection criteria and who had sufficient data available to calculate the eGFR and who were not already being managed by a nephrologist.

The categorical variables are described using absolute and relative frequencies. The continuous variables are described using the mean and standard deviation. Comparison of subgroups of patients was done with the Student *t* test or ANOVA for quantitative variables. For the qualitative variables, the  $\chi^2$  test was used. Values were considered to be statistically significant when the  $P < .05$ . The statistical analyses were done using the statistical program SAS, version 9.1.

## RESULTS

The study population included a higher proportion of men (65.6%), with a mean age of 65.5 (11.2) years. The most prevalent cardiovascular risk factors were dyslipidemia, arterial hypertension, and a sedentary lifestyle. As can be seen in Table, 60.2% of the patients had diabetes. The prevalence of concomitant clinical disease in the sample was: heart disease (65.7%), peripheral vascular disease (16.4%), and cerebrovascular disease (15.9%).

### Prevalence of CKD According to the Abbreviated MDRD Equation

The mean eGFR was 67 (18.5) mL/min/1.73 m<sup>2</sup>. Of 2608 patients, 62.7% did not have CRF, 18.9% had established CRF, and the remaining 18.4% had occult CRF. These percentages varied according to the specialty of the physician researcher (Figure). Of the patients with CRF, 83.1% had stage 3; 14.8% stage 4; and 2.1% stage 5.

Table shows the data concerning biodemographic characteristics, the risk factors and the cardiovascular disease details of the patients with and without CRF. The patients with CRF were older, more often female, and had a higher frequency of obesity, DM, and hypertension.

## DISCUSSION

This study demonstrates the high prevalence of CRF in patients with a high cardiovascular risk or cardiovascular disease in Spain. Furthermore, the prevalence of occult CRF was similar to that of established CRF, which indicates that plasma creatinine

**TABLE. Biodemographic Characteristics of the Whole Study Population and According to Whether the Patients Did or Did Not Have Chronic Renal Failure (CRF)**

	Total	No CRF	With CRF	P
Age, mean (SD), y	65.5 (11.2)	62 (11.3)	71.2 (8.3)	<.001 <sup>a</sup>
Male	65.6	89.5	25.5	<.05 <sup>b</sup>
BMI	29.4 (4.6)	28.9 (4.2)	30.2 (5)	<.001 <sup>a</sup>
Obesity	40.3	35.8	47.7	<.05 <sup>b</sup>
Abdominal obesity	66.8	62.4	74.1	<.001 <sup>b</sup>
Smoking	31.9	40.9	16.9	<.001 <sup>b</sup>
Sedentary lifestyle	69.4	63.4	79.4	<.001 <sup>b</sup>
Diabetes mellitus	60.2	55	69	<.001 <sup>b</sup>
Dyslipidemia	84	84.6	82.9	NS
Hypertension	83.6	78.7	91.8	<.001 <sup>b</sup>
Vascular disease	64.3	66.1	61.4	.014 <sup>b</sup>

DBMI indicates body mass index; NS, not significant; SD, standard deviation.

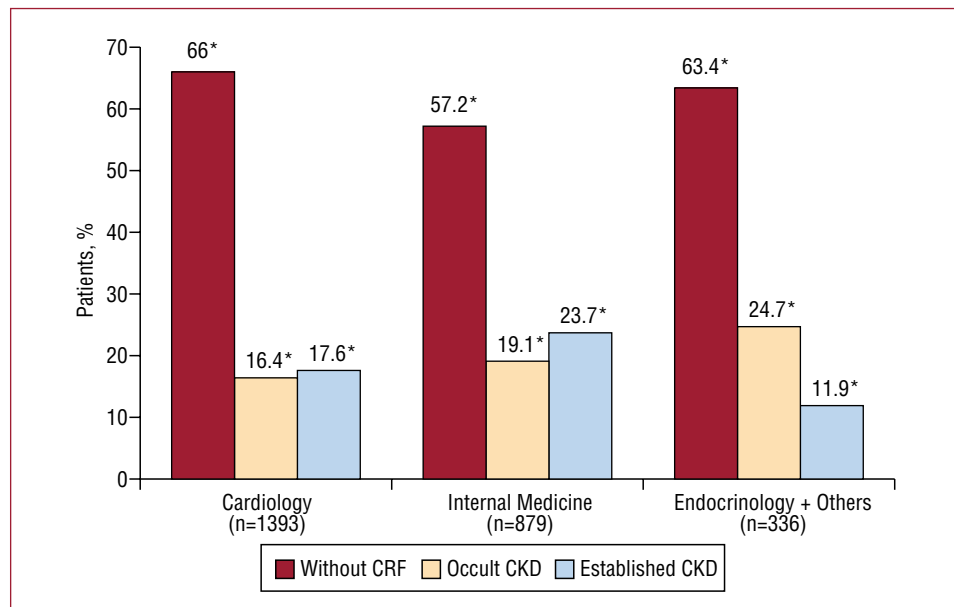
<sup>a</sup>Student t test.

<sup>b</sup> $\chi^2$  test

The data are expressed as mean (standard deviation) or a percentage.

**Figure 1.** Prevalence of chronic renal failure according to the abbreviated MDRD equation, with or without high serum creatinine concentrations, according to the specialty of the researcher. CKD indicates chronic kidney disease; CRF, chronic renal failure.

\*Statistically significant differences were found depending on the specialty of the researcher ( $\chi^2$  test,  $P < .05$ ).



is a marker with poor sensitivity to detect CRF, with the result that this entity may be underdiagnosed in many patients with a high cardiovascular risk.

Chronic renal failure is a predictive factor for the development of end-stage CRF and is associated with high levels of morbidity and mortality, due mainly to cardiovascular complications.<sup>9</sup> Thus, early detection and recognition of CRF is important in patients with a high cardiovascular risk to improve risk stratification, delay the progression to CKD and encourage early referral to the nephrologist.

The prevalence of stages 3-5 CKD in the general population is around 5%.<sup>10</sup> Preliminary data from

the EPIRCE study show the prevalence of CRF in the general Spanish population to be 5.1%.<sup>11</sup> The prevalence of CRF in our study was greater than that of population-based studies, probably because the patients included were characterized by having a high cardiovascular risk or cardiovascular disease, were older and had a higher prevalence of risk factors for CRF.

The limitation of this study concerns the fact that it was a cross-sectional study, which does not enable those patients with temporary disorders in renal function to be distinguished from those with true CRF. Another limitation is that the

GFR was estimated from an equation based on serum creatinine, measured in the relevant laboratory of each participating researcher, and this test is not standardized. Nevertheless, this study should be considered an approximation to be able to estimate with an acceptable error the prevalence of CRF in these patients with a high cardiovascular risk.

In conclusion, this study demonstrates the high prevalence of CRF in patients with a high cardiovascular risk. Of note was the high prevalence of occult CRF.

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