

Original article

Serum levels of the adipomyokine irisin in patients with chronic kidney disease[☆]

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ABSTRACT

Background: Irisin is an adipomyokine with claimed anti-obesity and anti-diabetic effects. This hormone has been insufficiently studied in patients with advanced chronic kidney disease (CKD).

Objective: To perform an exploratory analysis of serum irisin levels in patients undergoing different CKD treatments.

Method: Following a cross-sectional design, we estimated serum levels of irisin in 95 patients with CKD managed conservatively (advanced CKD), with peritoneal dialysis (PD) or with haemodialysis, and compared our findings with a control group of 40 healthy individuals. We investigated the correlations between serum irisin and demographic, clinical, body composition and metabolic variables.

Results: Irisin levels were lower in all the CKD groups than in the control group. The univariate analysis revealed limited correlations between irisin, on the one hand, and fat (but not lean) mass, glomerular filtration rate (GFR) and plasma albumin and bicarbonate, on the other. The multivariate analysis confirmed that advanced CKD patients managed conservatively (difference 111.1 ng/mL), with PD (25.9 ng/mL) or haemodialysis (61.4 ng/mL) (all $p < .0005$) presented lower irisin levels than the control group. Furthermore, PD patients presented higher serum levels of irisin than those on haemodialysis (difference 39.4 ng/mL, $p = .002$) or those managed conservatively (24.4 ng/mL, $p = .036$). The multivariate analysis also identified plasma bicarbonate ($B = 3.90$ per mM/l, $p = .001$) and GFR ($B = 1.89$ per mL/min, $p = .003$) as independent predictors of irisin levels. Conversely, no adjusted correlation between irisin and body composition markers was found.

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Conclusions: Serum irisin levels are low in patients with CKD and show a consistent correlation with GFR and plasma bicarbonate levels. PD patients present higher levels of irisin than those managed conservatively or with haemodialysis. Our study confirms a general inconsistency of the association between serum irisin levels, on the one hand, and body composition and metabolic markers, on the other.

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Niveles séricos de la adipomioquina irisina en pacientes con enfermedad renal crónica

R E S U M E N

Palabras clave:

Irisina
Enfermedad renal crónica
Filtrado glomerular
Diálisis Peritoneal
Hemodiálisis
Bicarbonato

Antecedentes: La irisina es una adipomioquina con posibles efectos antiobesidad y antidiabéticos. Esta hormona ha sido insuficientemente estudiada en pacientes con enfermedad renal crónica (ERC) avanzada.

Objetivo: Realizar un análisis exploratorio de los niveles séricos de irisina en pacientes con diferentes modalidades de tratamiento de la ERC.

Método: Según diseño transversal, estimamos niveles de irisina en 95 pacientes con ERC manejados conservadoramente (ERCA), con diálisis peritoneal (DP) o con hemodiálisis, comparándolos con un grupo control de 40 individuos sanos. También investigamos las correlaciones entre irisina sérica y variables demográficas, clínicas, metabólicas y de composición corporal.

Resultados: Los niveles de irisina fueron más bajos en cualquier grupo de pacientes que en los controles. El análisis univariante desveló correlaciones moderadas entre irisina, por un lado, y masa grasa (pero no magra), filtrado glomerular (GFR) y albúmina y bicarbonato plasmático, por otro. El análisis multivariante confirmó que los pacientes con ERCA (diferencia 111,1 ng/mL), en DP (25,9 ng/mL) o hemodiálisis (61,4 ng/mL) (todos $p < 0,0005$) presentaban niveles ajustados más bajos de irisina que los controles. Asimismo, los pacientes en DP presentaban niveles más altos de la hormona que los de hemodiálisis (diferencia 39,4 ng/mL; $p = 0,002$) o ERCA (24,4 ng/mL; $p = 0,036$). El análisis multivariante también identificó bicarbonato plasmático ($B = 3,90$ por mM/L; $p = 0,001$) y GFR ($B = 1,89$ por mL/min; $p = 0,003$) como predictores independientes de los niveles de irisina. Por el contrario, no observamos correlación ajustada entre irisina y marcadores de composición corporal.

Conclusiones: Los niveles de irisina son bajos en pacientes con ERC, y muestran correlación consistente con GFR y bicarbonato plasmático. Los pacientes en DP presentan niveles más altos de irisina que los manejados conservadoramente o con hemodiálisis. Nuestro estudio confirma una inconsistencia general en los análisis de asociación entre irisina sérica, por un lado, y marcadores metabólicos y de composición corporal, por otro.

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Introduction

In recent years, muscle tissue has been emerging as an important endocrine organ, involved in regulating many physiological processes.¹⁻³ Irisin⁴ is an adipomyokine that appears to participate in regulating energy metabolism and other physiological processes. Its best-known and probably most important function is to break down body fat, thereby converting it into brown adipose tissue.⁴ The main consequence is an increase in energy expenditure, caused by the thermogenic nature of brown fat. This phenomenon contributes to the regulation of body temperature as an immediate effect but other potential consequences include weight loss and therefore a decrease in plasma levels as well as an improvement

in insulin tolerance. Therefore, irisin could have a beneficial effect against obesity and as an antidiabetic agent.^{5,6}

The effects of chronic kidney disease (CKD) on the synthesis and secretion of irisin, and its influence on the complex metabolic disorders of CKD patients, have not been investigated sufficiently. Some studies have reported relatively low levels of serum irisin in patients with advanced CKD,⁷⁻⁹ but the comparative effect of different treatment methods has not been evaluated adequately. In addition, the correlations observed between irisin and different clinical, biochemical and metabolic markers in these patients are controversial.

We have undertaken a cross-sectional, exploratory analysis of a large sample of patients with CKD on different modalities of treatments. Our goal was to conduct a comparative analysis of irisin levels and uncover potential associations with

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