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## **Nucleosides, Nucleotides and Nucleic Acids**

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713597286>

## **Metabolic Syndrome Characteristics in Gout Patients**

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Online publication date: 11 June 2010

**To cite this Article** Fraile, J. M. , Torres, R. J. , de Miguel, Mendieta E. , Martínez, P. , Lundelin, K. J. , Vázquez, J. J. and Puig, J. G.(2010) 'Metabolic Syndrome Characteristics in Gout Patients', *Nucleosides, Nucleotides and Nucleic Acids*, 29: 4, 325 – 329

**To link to this Article:** DOI: 10.1080/15257771003738709

**URL:** <http://dx.doi.org/10.1080/15257771003738709>

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## METABOLIC SYNDROME CHARACTERISTICS IN GOUT PATIENTS

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□ Gout is commonly associated with obesity, arterial hypertension, diabetes, and dyslipidemia. However, the prevalence of metabolic syndrome has not been widely recognized in patients with gout. We studied 41 patients (37 males) with primary gout to assess the prevalence and characteristics of the associated metabolic syndrome. Twenty-one patients with gout (51%) showed  $\geq 3$  criteria for the metabolic syndrome. Pathological conditions associated were obesity (21/41), high blood pressure (30/41), dyslipidemia (30/41), and fasting plasma glucose  $\geq 100$  mg/dL (22/41). The most frequent triad was the presence of increased waist circumference, elevated fasting plasma glucose, and hypertension. Mean serum urate concentration did not differ significantly in gout patients with the metabolic syndrome (8.5 mg/dL) and without (8.1 mg/dL). Given the complications associated with metabolic syndrome, its diagnosis may determine the long-term treatment of patients with gout.

**Keywords** Gout; metabolic syndrome; uric acid; hyperuricemia

### INTRODUCTION

Metabolic syndrome (MS) is a well-known cluster of cardiovascular risk factors related to insulin resistance.<sup>[1]</sup> Gout is commonly associated to pathological conditions such as obesity, high blood pressure, dyslipidemia, and glucose intolerance or diabetes.<sup>[2]</sup> Thus, a high prevalence of MS is expected among patients with gout. To the best of our knowledge, only one previous study has examined the prevalence of MS among individuals with gout.<sup>[3]</sup> This was a population-based study (NHANES-III, conducted between 1988

This work was supported by grants from Fondo de Investigaciones Sanitarias FIS 06/0019 and FIS 08/0009 and by RECAVA (Red de Enfermedades Cardiovasculares). We are indebted to the nursing staff (Arantxa Sánchez Martín, Gemma Santas Camino, Inés Narillos Sánchez, Cristina Martín García, Ana Moreno Guerrero, Ainara López Sánchez-Seco, Juan Miguel Castro Alvarez, and Rocio Campos-Guereta Martel) for excellent patient care. Drs. José Suero Palancar, Isabel Laguna Sorinas, Ma Angeles Martínez López, Beatriz Martínez Núñez, referred their patients for the study. We gratefully acknowledge Carolina Velasco García for her superb work as clinical research associate.

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and 1994 among no institutionalized U.S. civilian population), and the result (62.8%, 95% CI, 51.9–73.6%) might differ from that of a Mediterranean population with gout. In this study, we aimed to assess the prevalence of MS among patients with gout diagnosed at a Spanish University Hospital.

## PATIENTS AND METHODS

Caucasian subjects, aged  $\geq 18$  years, with primary gout according to Wallace criteria<sup>[4]</sup> were admitted into the study after informed consent was obtained. Patients with secondary gout and enzyme defects were not included. All patients underwent a thorough clinical evaluation to assess the presence of MS, according to the ATP III criteria.<sup>[5]</sup> Patients with  $\geq 3$  of the following criteria were defined as having metabolic syndrome: abdominal obesity (waist circumference  $> 102$  cm in men and  $> 88$  cm in women), hypertriglyceridemia ( $\geq 150$  mg/dL), low high-density-lipoprotein (HDL) cholesterol ( $< 40$  mg/dL in men and  $< 50$  mg/dL in women), high blood pressure ( $\geq 130/85$  mmHg), and high fasting glucose levels ( $\geq 100$  mg/dL).<sup>[5]</sup> Patients currently reporting the intake of antihypertensive or antidiabetic medications (oral agents or insulin) were classified as having high blood pressure or diabetes, respectively. Three blood pressure readings were obtained and the average of the last two readings was used in the analyses. Blood tests were obtained after all the patients followed a period of 3–5 days a diet restricted in purine. Blood chemistry analyses were performed in the general core laboratory using a Hitachi 704 Analyzer. Allopurinol was withheld for at least three months. Colchicine prophylaxis (0.5–1.0 mg/day) was administered to prevent acute gouty flares.

## RESULTS

Forty-one subjects (37 males) with a mean age ( $\pm$  standard deviation) of 58.5 ( $\pm 12$ ) years were included in the study. The main clinical characteristics of the patients are shown in Table 1.

Twenty one gout patients showed three or more criteria to establish the diagnosis of MS. MS defining pathological conditions associated with gout were obesity (21/41), high blood pressure (30/41), dyslipidemia (22/41), and fasting plasma glucose  $\geq 100$  mg/dL (30/41). The number of patients with none, one or two criteria were 1, 8, and 11, respectively. The number of patients with three, four, and five criteria were 12, 8, and 1, respectively. The most frequent triad was increased waist circumference, elevated plasma glucose, and high blood pressure. The second most frequent triad was increased triglyceride level, elevated plasma glucose, and high blood pressure. Serum urate was found to be above 7.0 mg/dL in all patients, except in two. Mean serum urate concentration did not differ significantly in gout patients

**TABLE 1** Clinical characteristics of the patients

Patients (N)	41
Males (N)	37
Age (yrs)*	58.5 ± 12.7
Serum urate (mg/dL)*	8.3 ± 1.6
Obesity (N)	21
Hypertension (N)	30
Fasting plasma glucose ≥ 100 mg/dL (N)	22
Metabolic syndrome (N)	21
Waist circumference criteria (N)	14
Hypertension criteria (N)	20
Hypertriglyceridemia criteria (N)	13
Low HDL cholesterol criteria (N)	9
Fasting plasma glucose criteria (N)	17
Serum urate (mg/dL) in patients with MS*	8.1 ± 1.8
Serum urate (mg/dL) in patients without the MS	8.5 ± 1.4

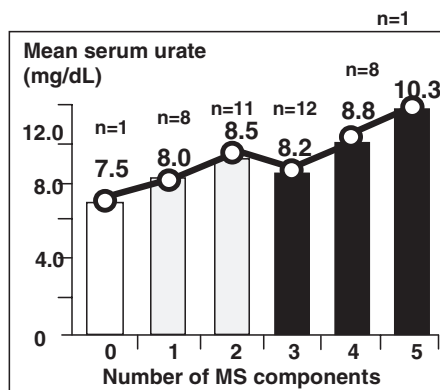
N, number of patients; MS, metabolic syndrome; \*mean ± SD.

with MS (8.5 mg/dl) and without MS (8.1 mg/dl). Serum urate increased with the number of MS components (Figure 1;  $p < 0.05$ , for trend).

## DISCUSSION

In our study, the MS was present in 51% (21/41) of gout patients. This is a high prevalence and its importance lays in the cardiovascular morbidity-mortality associated to MS. The number of subjects in this preliminary study is small, but on the other hand we have been able to make a thorough clinical evaluation in all participating subjects in a university hospital to assess the presence of MS and gout.

The prevalence of MS in gout patients in our study is slightly lower than that reported in a no institutionalized US civilian population with gout



**FIGURE 1** Mean serum urate levels in gout patients according to the number of metabolic syndrome components.

(62.8%; 95% CI 51.9–73.6%).<sup>[3]</sup> In that study, the prevalence of MS was more than two-fold greater in patients with gout than in individuals without gout (25.4%; 95% CI 23.5–27%). The prevalence of MS in general population without gout in that study was similar to that found in our previous population based study in the Madrid province (25%; 95% CI, 21–28%).<sup>[6]</sup>

Although serum urate has been consistently reported to be elevated in patients with MS,<sup>[7–9]</sup> we did not find significant difference in mean serum urate concentration in gout patients with MS (8.5 mg/dl) and without MS (8.1 mg/dl). This may be due the small number of patients in our study.

Previous studies have revealed that serum urate increases with the number of components of MS,<sup>[10–11]</sup> even when adjusted for several confounding factors such as age, gender, creatinine clearance, and alcohol and diuretic use. In our data there is a trend of increasing serum urate concentration with the elevation of the number of MS components ( $p < 0.05$ , for trend; Figure 1). In our previous population-based study,<sup>[2]</sup> we found a graded increase in serum urate levels with increasing number of MS components.

The result of this study indicates that the prevalence of MS is remarkably high among patients with gout. Hyperuricemia has been related to decrease renal uric acid excretion,<sup>[7]</sup> which may be mediated by enhanced proximal tubular sodium reabsorption and hyperinsulinemia.<sup>[10]</sup> Reduced uric acid excretion due to enhanced sodium reabsorption has also been reported in conditions such as obesity and hypertension,<sup>[11]</sup> the two most common diseases associated with the metabolic syndrome. Clinicians should be aware of the presence of MS in gout patients to be able to establish a treatment aimed to reduce the increased overall cardiovascular risk of these patients. Further studies are needed to assess whether cardiovascular risk is increased in subjects with gout and MS.

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