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Brief Paper

Fructose-induced hyperuricemia in psoriasis and psoriatic arthritis

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ABSTRACT. *Acute intravenous infusion of fructose was given to 30 normal subjects and 27 normouricemic patients affected by psoriasis, 12 with cutaneous involvement only and 15 with psoriatic arthritis. Serum uric acid was measured before and after infusion. A significantly lower increase in serum uric acid levels was found in psoriatic patients in comparison to controls, and the increase rate appeared to be significant only in controls. Moreover, the overall fructose-induced hyperuricemia was significantly lower in the group of patients with psoriatic arthritis than in normal subjects.*

Since the fructose-induced increase of serum uric acid is most probably achieved by an augmented turnover of preformed purine nucleotides, it is suggested that in normouricemic patients with psoriasis the «pool» of purine nucleotides is lower than normal. Such a condition seems to be more evident in psoriatic arthritis.

Key words: Fructose infusion, hyperuricemia, psoriasis, psoriatic arthritis.

Introduction

Hermann is said to have first pointed out hyperuricemia in psoriasis (1). Subsequently, others reported such feature (2, 3). It has been suggested that hyperuricemia in psoriasis may be caused by increased turnover of nucleic acid, which in this disease seems to be related to marked epidermal proliferation (4). In fact, a correlation has been observed between serum uric acid and the extent of skin lesions (4). On the other hand, no differences in serum uric acid levels have been observed by some authors between a group of patients with psoriasis and normal subjects (2) or between rheumatoid arthritis and psoriatic arthritis (5).

Since acute intravenous infusion of fructose is known to induce an increase in uricemia, most probably through an accelerated metabolism of preformed purine nucleotides (6, 7), we performed it in two groups of patients affected by psoriasis, with or without arthritis respectively, and in normal subjects as controls. The aim was to provide further information on uric acid metabolism in psoriasis and psoriatic arthritis.

Materials and Methods

The study was carried out on 30 normal subjects and 27 patients with psoriasis. Normal subjects included

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22 males and 8 females, aged from 15 to 49 years. One group of 12 psoriatic patients, 8 males and 4 females, aged between 30 to 69 years, had typical skin lesions only. Another group of 15 patients, 11 males and 4 females, 37 to 65 years of age, presented with arthritis and psoriasis, 8 with a clinical picture of classic psoriatic arthritis, 3 with oligoarthritis, 2 with symmetric polyarthritis and 2 with spondylitis, according to Wright and Moll's classification (8). All patients had normal serum uric acid levels and normal renal function as assessed by creatinine clearance, and none of them were treated with steroids or non-steroid anti-inflammatory drugs, nor with other drugs which might affect uric acid metabolism or excretion, for at least 7 days before investigation.

In every case acute fructose infusion was performed at the same morning time with the subjects quietly resting in bed. After taking a basal blood sample, a fructose infusion (0.3 g/kg body weight) was given within 3 minutes. Subsequently, blood samples were collected 15, 30 and 60 minutes after the end of the infusion.

In all samples serum uric acid was measured by the spectrophotometric method using purified uricase (9).

In each case, the overall 60-minute fructose-induced hyperuricemia was estimated by calculating the integral under the serum uric acid concentration curve, using the trapezoidal rule.

The rate of change of serum uric acid levels during a single time interval Δ (t) was determined by the ratio $\Delta SUA/\Delta t$, where SUA stands for serum uric acid.

Statistical assessment was obtained by analysis of variance (one way) and by Student's *t* test for unpaired data.

Results

Basal and fructose-induced uric acid levels in normal subjects and in psoriatic patients, with and without arthritis, are reported in Fig. 1. The comparison between all psoriatic patients and controls shows that the increase in serum uric acid is significantly lower 30 min after infusion in the former; no significant differences are observed between the patients with psoriasis only and those with psoriatic arthritis. When the group with psoriatic arthritis is compared to the normal subjects, significantly lower uric acid values are found both in basal condition and 30 min after fructose infusion (Fig. 1).

The analysis of variance applied to all groups, taken into consideration as a whole at every time-interval, shows a significant increase of uricemia 30 min after infusion ($F = 3.10$; $p < 0.05$). However, if the ratio $\Delta SUA/\Delta t$ is considered, only in normal subjects is a significant increase observed from 15 to 30 min after fructose infusion ($F = 5.59$; $p < 0.01$).

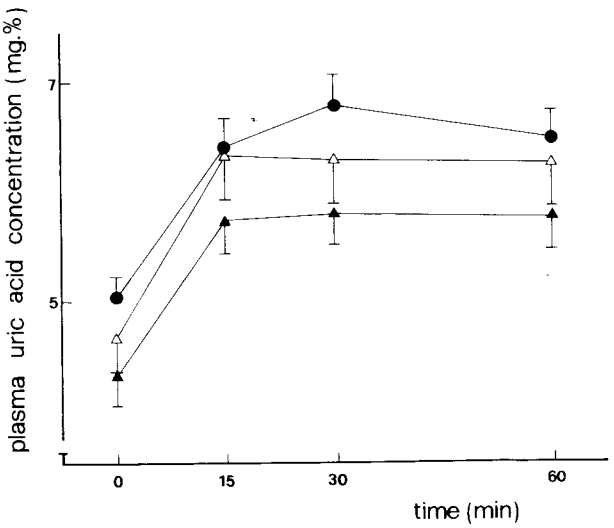

Fig. 1 - Effect of a rapid intravenous infusion of fructose (0.3 g/kg body weight) on plasma uric acid concentration in controls (●), psoriatic patients without arthritis (△) and psoriatic patients with arthritis (▲).

No differences are seen when serum uric acid curve integrals of controls and of all the patients are compared. Significantly lower levels are found, however, in the group with psoriatic arthritis in comparison with controls ($t = 2.085$; $p < 0.05$) (Table I).

Discussion

In normouricemic patients with psoriasis, both with and without associated arthritis, as well as in normal subjects, acute fructose infusion induces an increase in serum uric acid levels. Such an increase is lower in psoriatic patients than in controls. In fact, when all patients, regardless of the presence of arthritis, are compared with normal subjects, a significant difference of serum uric acid values is found 30 minutes after fructose infusion. The difference is greater when the group with psoriatic arthritis alone is compared to controls. Furthermore, in the former group the overall amount of uric acid released after fructose infusion appears to be significantly lower than in controls, as indicated by a comparison of the serum uric acid curve integrals (Table I).

Although only normouricemic psoriatic patients were taken into consideration in this study, our results are rather unexpected. Hyperuricemia has been frequently (1, 3, 4), although not always (2), reported in psoriasis, hence it is difficult to explain the lower than normal fructose-induced increase of uricemia in our psoriatic patients. They had normal renal function and in a previous in-

Table I. Mean, standard deviation and standard error of the curve integrals of uricemia induced by acute intravenous fructose infusion in healthy subjects and in psoriatic patients with and without arthritis.

	Controls	Psoriatic patients without arthritis	Psoriatic patients with arthritis
Number of patients	30	12	15
mean	383.61	364.98	334.48
standard deviation	79.38	78.82	63.17
standard error of the mean	14.4	22.7	16.3

vestigation on hypertensive normouricemic patients with normal renal function we observed that renal excretion of uric acid after acute fructose infusion showed no difference from controls (10). Thus we may hypothesize that in our psoriatic patients, as in hypertensive and normal subjects, renal excretion of uric acid is unaffected by acute fructose infusion.

To explain our results, it should be borne in mind that acute fructose infusion most probably brings about a rise in serum uric acid levels through an augmented turnover of preformed purine nucleotides (7) rather than via an increase of the «de novo» synthesis of uric acid. Therefore, we may suggest that in normouricemic psoriatic patients the pool of preformed purine nucleotides is reduced, and such a condition appears to be more evident in patients with psoriatic arthritis. Whether this is due to the disease itself, to associated disorders or to other causes like chronic drug administration, particularly when arthritis is associated, remains to be investigated.

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