WHY SOME PLANT EXTRACTS PREVENT STONE FORMATION?

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Introduction

Since ancient times a variety of single and combined herbal preparations have been used with supposed success in renal lithiasis therapy. Conclusive scientific data on the exact clinical role and efficacy of these herbs remains to be determined. Recently, some antioxidant capacity has been potentially attributed to *Trigonella foenum-graecum L.* seeds, supporting folk information regarding antiurolithiasic activity of the plant.
The aim of the present communication is to evaluate the antilithiasic capacity of a traditional mallorcan herbal preparation and to compare the obtained results with those corresponding to two typical antioxidant flavonoids such as catechin and epicatechin.

Objetives

The aim of the present communication is to evaluate the antilithiasic capacity of a traditional mallorcan herbal preparation and to compare the obtained results with those corresponding to two typical antioxidant flavonoids such as catequin and epicatequin.

Methods

Thirty six male Wistar rats were used. The animals were assigned to four groups (n=9). Rats of the CTR-group were not treated and were used as controls, CAT-group was treated with drinking water supplemented with 100 mg/L catechin, EPI- group with drinking water supplemented with 100 mg/L epicatechin, and FHE- group with drinking water supplemented with 7 ml/L of a folk herbal extract with assigned antilithiasic activity very popular in the Balearic Islands. The treatment was done during 22 days.

Table 1. Urinary parameters at the end of the experiment, following 8 days of ethylene glycol supplementation.

Group	Control	CAT-treated	EPI-treated
V (mL/24h)	6.4 ± 0.9	8.8 ± 2.5	4.8 ± 0.9
pH	8.3 ± 0.3	7.7 ± 0.4	8.9 ± 0.1
Phosphorus (μmol/24h)	415.3 ± 53.5	450.1 ± 153.9	502.7 ± 41.5
Calcium (μmol/24h)	5.7 ± 0.9	4.8 ± 2.1	4.6 ± 1.2
Magnesium (μmol/24h)	32.8 ± 2.3	21.0 ± 8.2	21.2 ± 0.3
Oxalic acid (μmol/24h)	74.2 ± 18.6	56.0 ± 15.4	64.3 ± 13.0
Citric acid (μmol/24h)	6.8 ± 1.2	5.8 ± 2.1	2.9 ± 0.3

Values represent mean ± SE of nine animals per group
* Values are significantly different to control $p<0.05$
[a] Values are significantly different to CAT-treated $p<0.05$
[c] Values are significantly different to EPI-treated $p<0.05$

After 16 days after treatment start, calcium oxalate lithiasis was induced during 8 days, by adding 0.8 % V/V ethylene glycol plus 1 % W/V NH_4Cl to drinking water of each group. On the last day of the experiment, 24 h rat urine was collected by use of metabolic cages. Finally animals were sacrificed and kidneys were removed for histological and mineral evaluation.

Traditional mallorcan herbal extract:

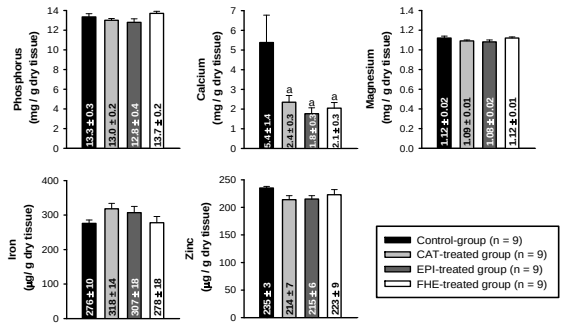
Arctotaphylos uva-ursi L. fluid extract	2.16%
Zea mays L. fluid extract	2.16%
Sabal serrulata L. tincture	21.5%
Agathosma betulina L. tincture mother	17.5%
Ricinus zanzibariensis L. fluid extract	46.48%
Glycerin	10%
Anis essence	0.2%

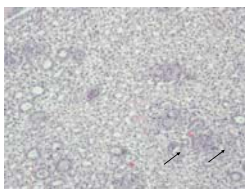
(*Farmacia Salva Trobat, Palma de Mallorca, Spain)*.

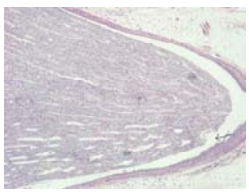
Results

The results of main urinary biochemical data (Ca, Mg, P, oxalate and citrate) demonstrated that no significant differences between treated and untreated groups were noticed (Table 1). Calcium concentration in the kidney tissue had a significant decrease in CAT-group (2.35±0.34 mg/g), EPI- group (1.76 ± 0.29 mg/g) and FHE- group (2.04 ± 0.27 mg/g) versus CTR-group (5.38 ± 1.39 mg/g); nevertheless no significant differences between the three treated groups (CAT-group, EPI- group and FHE- group) were detected (Fig. 2). Examination of kidney paraffin sections by polarized light showed that CTR-group rats had the greatest amount of intratubular and papillary crystals (Figs. 2, 3 and 4.

Fig 2. Renal concentration at the end of the experiment, following 8 days of ethylene glycol supplementation. (a Values are significantly different to control *p<0.05)







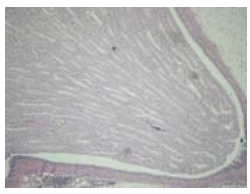


Figure 3. Intratubular crystals in kidneys of ethylene glycol control-treated rats (original magnification X100).

Figure 4. Crystal deposits on the surface of the papillary tips in kidneys of ethylene glycol control-treated rats (original magnification X40).

Figure 5. Absence of crystal deposits on the surface of the papillary tips in kidneys of epicatechin-treated rats (original magnification X40).

Conclusions

The first studies on experimental ethylene glycol renal lithiasis appeared in the 60' decade but the importance of the oxidative damage caused by hyperoxaluria was not clearly proposed until the end of the century. The present study examined the effects on ethylene glycol treated rats of clearly recognized antioxidant herbal flavonoids as catechin and epicatechin and the results were compared with those obtained using a folk herbal extract that also contained recognized antioxidants. As in previous studies, the medicinal plants used had little effect on urinary chemistry of urolithiasis. In fact the consuption of catechin or epicatechin did not cause any effect on urinary chemistry. Nevertheless, when ethylene glycol rats were treated with the folk herbal extract, the calcium deposits in the kidney were significantly reduced, being the obtained results similar to those obtained when EG rats were treated with antioxidants of vegetal origin as catechin and epicatechin. There results clearly demonstrate the ability of antioxidants to prevent the development of papillary and intratubular renal crystals on the kidney, consequently preventing the development of papillary calculi.