

**PRECLINICAL STUDIES OF THREE DIURETIC PLANTS OF
TRADITIONAL USE IN CUBA**

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Summary

Although the herbal drugs have been used during centuries, alone a small quantity of plants has been investigated through scientific methods that validate its use for that reason the objective of this work is the pharmacological and toxicological evaluation of flowing extracts of three diuretic medicinal plants of wide popular use: *Xanthium strumarium* L, *Lepidium virginicum* L and *Archryrantes aspera*. It was carried out in the Toxicology and Pharmacology Experimental Unit of Camagüey. The diuretic action was evaluated for each extract according to the method of Lipschitz. For evaluation of diuresis, 40 female line Wistar rats was used distributed aleatorily in 5 groups. The groups were the following ones: G 1 negative control, G 2, 3 and 4 extracts dose of 200, 400 and 800 mg/Kg respectively and G 5 positive control. The used variables were: volumetric urinary excretion (VUE%) and excretion of electrolytes in urine. Toxicological evaluation was carried out according to the Acute Toxicity by Classes Method (CTA) starting from preset dose of 25, 200 and 2 000 mg/kg. The used variable was the variation of the corporal weight. In both studies it was carried out the variance analysis (ANOVA) of a classification road, followed by Tuckey multiple ranges test. The three researched extracts had an VUE % bigger that the negative control and in the case of the *L. virginicum* L. superior to the positive control. In all cases 400 mg/Kg of weight dose was the biggest VUE %. The three plants caused significant excretion of electrolytes. The evaluation toxicological of the extracts threw that plows not toxic for to 2000 mg/Kg of weight dose, significant decrease of corporal weight was not observed, neither signs nor symptoms that evidenced toxic effect existed.

Key words: *Xanthium strumarium* L, *Lepidium virginicum* L, *Archryrantes aspera*, diuretic herbal drugs.

Introduction

The man, through his evolution like human species, used to take products from the nature with the objective of curing illnesses that he suffered. It had a completely empiric character in their beginnings. With the science advance and in a particular way with the increment on the theoretical medicine knowledge, it was sitting down every time more on scientific bases (1-3). In spite of the great development reached by the chemical synthesis, at the present time the medicinal plants continue being a valuable arsenal of biologically active substances and precursors of the same ones, either in form of vegetable medication and matter for the pharmaceutical industry. Today we are the beneficiaries with the experience that has contributed to the development of the current phitotherapy that aspires to perform an important paper in the therapy of the future; but the application of the medicinal plants should be made on a scientific base that validates the therapeutic effectiveness and the relative safe of the same ones (4-6). Although the herbal drugs have been used during centuries, alone a small quantity of plants has been investigated through scientific methods that validate its use for that reason the objective of this work is the pharmacological and toxicological evaluation of flowing extracts of three diuretic medicinal plants of wide popular use: *Xanthium strumarium* L, *Lepidium virginicum* L and *Archryantes aspera*.

Materials and methods

This research was carried out in the Toxicology and Experimental Pharmacology Unit of Camagiüey. Wistar rats from both sexes and healthy with a weight between 200 and 250 grams were used like animal model to determin the diuretic effect. The variation in the weight didn't exceed 20% of the weight average of the animal. The feeding consisted on ratonina and the supply of water was *ad limitum*.

The diuretic action was evaluated according to the method of Lipschitz. 40 rats were used for each extract distributed at random into 5 groups: G 1 negative control, G 2, 3 and 4 extracts dose of 200, 400 and 800 mg/Kg respectively and G 5 positive control (10mg/Kg hidroclorothiazida). The extracts were supply through stems intragastric to reason of 2 ml/Kg of animal weight. It was used the total 6 hours urine, and the analyzed variables were the volumetric urinary excretion (VUE%) and the sodium and potassium electrolytes excretion. Following formula was used to determine the VUE%: (VUE% = (urine excreted's Volume / liquid administered's Volume) X 100)

Toxicological evaluation was carried out according to the Classes Method of Oral Acute Toxicology. Wistar rats were used with a weight between 150 and 200g. The ressearch began with 3 female animals for each studied extract. The doses were selected according to a series of levels of defined doses: 25, 200, 2000 mg/Kg of weight body. It began with a 2000 mg/Kg of weight corpora dose.

The animals were observed daily during 14 days. Variable used was the corporal weight of the animals which was controlled at days: 0; 7 and 14. Animals were sacrificed at the 14 day and it is carried out a necroses to detect possible macroscopic and histological damages in the animals treaties.

In both studies statistical analysis was performed using one-way analysis variance (ANOVA), followed by Tuckey multiple ranges test with $p < 0.05$.

Results

To evaluate the diuretic effect of the plants extracts of the *X. strumarium* L, *L. virginicum* L and *A. aspera* it was considered to analyze the results of the volumetric urinary excretion and the sodium and potassium electrolytes excretion until 6 h after administering the extract for oral way. The obtained results are related next:

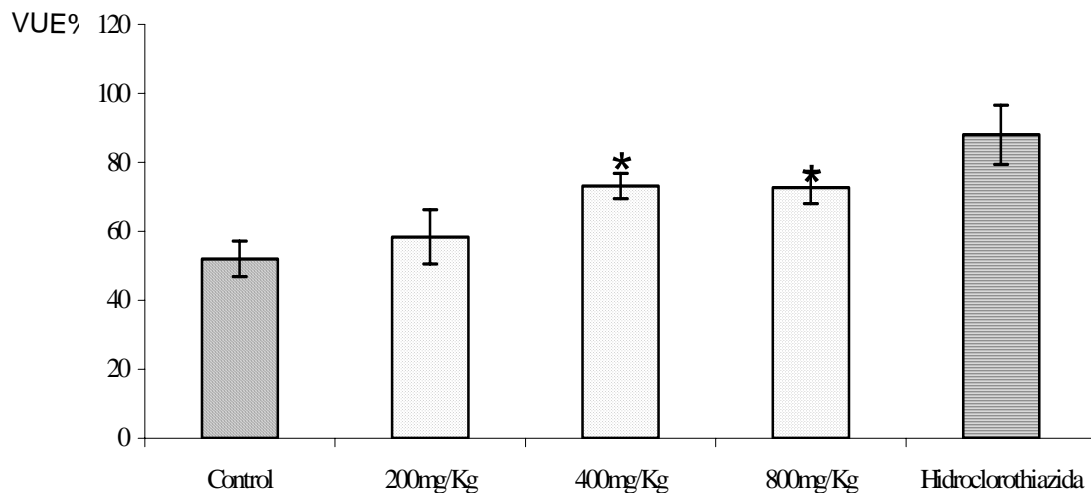


Figure 1: Effects of *X. strumarium* extract on rat's Volumetric urinary excretion (VUE%). Results are expressed as means \pm 1 SD (n=10). *P<0.05 vs. control (water).

Figure 1 shows the results of the comparative study of the *X. strumarium* L. extract with the control. The VUE% of 400 and 800mg/Kg of weight doses were significantly superior to the negative control but inferior to the positive control. The 200mg/Kg of weight dose was not significantly different to negative control.

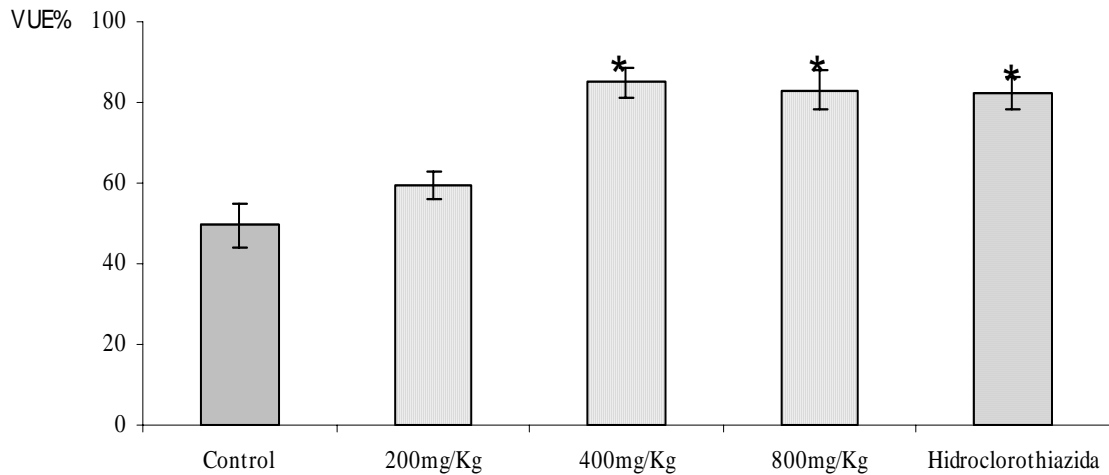


Figure 2: Effects of *L. virginicum* extract on rat's Volumetric urinary excretion (VUE%). Results are expressed as means \pm 1 SD (n=10).*,P<0.05 vs. control (water).

Figure 2 shows the results of the comparative study of the *L. virginicum* extract with the control. The VUE% of rats treated with 400 and 800mg/Kg of *L. virginicum* extract increase with respect to negative control. The effects of the doses of 400 and 800mg/Kg were significantly superior to the negative control, and it was not statistically different to the positive control. 400mg/Kg of weight dose was which showed the biggest EVU%.

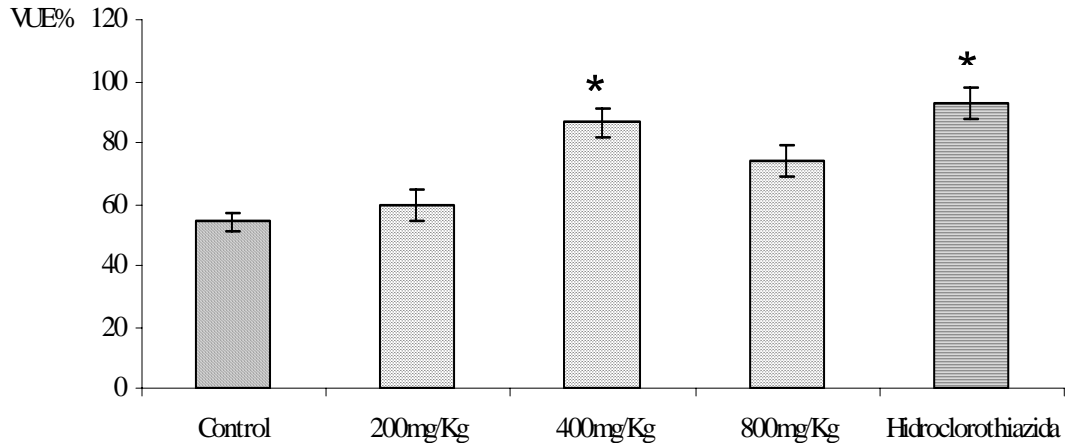


Figure 3: Effects of *A. aspera* extract on rat's Volumetric urinary excretion (VUE%). Results are expressed as means \pm 1 SD (n=10).*,P<0.05 vs. control (water).

Figure 3 shows the results of the comparative study of the *A. aspera* extract with the control. The treatment with 400 and 800mg/Kg of *A. aspera* extract increase the VUE% respect to negative control. The 400mg/Kg doses showed the biggest EVU%. It was not showed statistically difference whit positive control.

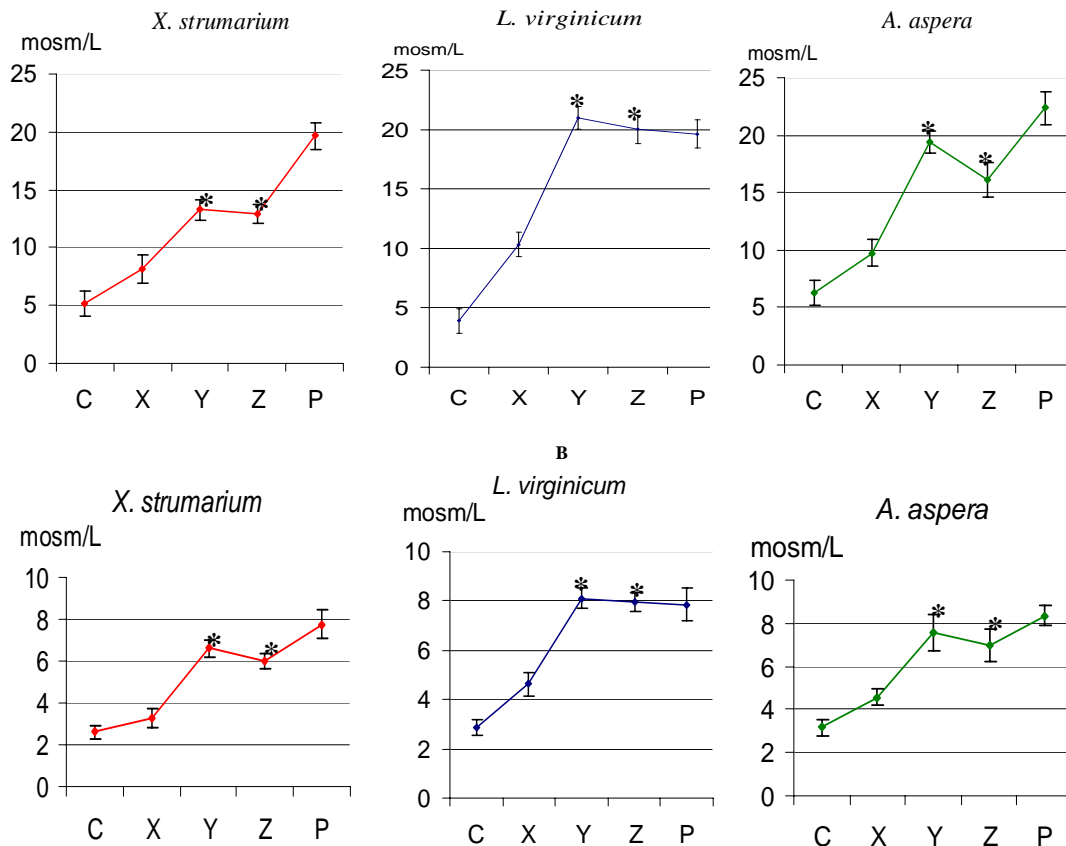


Figure 4: Effect of each researched extracts on rat's electrolytes excretion. **A** sodium excretion. **B** potassium excretion. C: negative control (water). X: 200mg/Kg of weight dose. Y: 400mg/Kg of weight dose. Z: 800mg/Kg of weight dose. P: Hydrochlorothiazida. Results are expressed as means±1 SD (n=10). *P<0.05, **P<0.01 vs. corresponding control (water).

Figure 4A shows the rat's sodium excretion in the investigated extracts. It is been able to see that always corresponds the biggest sodium excretion to the biggest VUE%. 400mg/Kg of weight dose was which showed the biggest sodium excretion in all the cases. The extract with more sodium excretion was that of *L. virginicum* which coincides with the extract that biggest VUE%. Figure 4B shows the potassium excretion in the investigated extracts, showing a very similar behavior to the sodium excretion. 400mg/Kg of weight corporal dose was that showed the biggest potassium excretion. *L. virginicum* extract was that showed the biggest excretion of this electrolyte.

The toxicologic evaluation of the researched extracts to the dose of 2000mg/Kg of weight didn't show in none of the cases signs and toxicity symptoms. The weight of the animals was measured a days 0, 7 and 14. It did not show significant differences for a $p < 0.05$. Deleterious effect was not observed. Necropsy performed didn't show macroscopic and histologic damages in none of the studied organs (data not shown).

Discussion

Raman MH, *et al* thinks about that the diuretic effect of the plants is due to its effect acuaretic. In a general way this theory thinks about that the diuretic action is derived of an increment in the renal circulation. It translates himself in a bigger rate of glomerular filtration with the rising increase in the primary urine formation (7). However, through this investigation it is evidenced that although the diuretic effect of these plants could be due to its acuaretic effect they also have a similar effect to the synthetic diuretics effect which inhibit the reabsorption of sodium causing the osmotic elimination of its equivalent one in water. This would explain because as the dose increases the VUE% it increases until the 400 mg/kg of weight dose and then to more doses the VUE% it stays. It could be due to the sodium carriers of the nephron would be the possible therapeutic reveilles of the active principles present in the diuretic medicinal plants and it are saturated to high doses (8). Toxicologic acute oral evaluation for the classes method didn't show toxic effects. Due to the diuretic effect shown by the studied medicinal plants it is recommended the realization of subchronic and chronic toxicologic tests.

Conclusions

The three studied plants extracts showed a diuretic effect. 400 mg/Kg of corporal weight dose was the dose that biggest EVU% showed. The extracts of the plants *Lepidium virginicum* L and *Archyranthes aspera* L. to the doses of 400 mg/Kg showed a diuretic effect compared with the positive control (hidroclorothiazida). All the extracts had effect natriuretic and kaluretic. The studied extracts don't present toxic effects for the dose of 2000 mg/Kg of corporal weight.

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