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EXPERIMENTAL STUDY

Acute toxicity study of Aspidopterys obcordata aqueous extract in Sprague-Dawley rats

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Abstract

OBJECTIVE: To examine the acute toxicity of an aqueous extract of Aspidopterys obcordata (A. obcordata) in Sprague Dawley rats.

METHODS: The rats were orally administered a dose of 5000 mg/kg body weight and observed continuously for 6 h and then daily for 14 days. Control rats were administered distilled water. The effect of the extract on general behavior, body weight, and food and water intake were measured. After 14 days, the rats were sacrificed and their organs (liver, heart, spleen, lungs, kidney, adrenal glands, ovaries, and testes) were removed for macroscopic examination. The body and organ weights in addition to hematology (e.g., hemoglobin and white blood cell counts) and clinical blood biochemistry (e.g., albumin and bilirubin) were also examined.

RESULTS: There were no deaths recorded, and the rats treated with A. obcordata showed no signs of toxicity. All measured parameters in rats treated with A. obcordata were unaffected when compared with those in control rats. The acute toxicity (LD_{50}) was estimated to be > 5000 mg/kg body weight.

CONCLUSION: Our results demonstrate the safety of an acute oral administration of an aqueous extract of A. obcordata in rats and indicate that future subacute and long-term toxicity testing of A. obcordata is warranted.

Key words: Aspidopterys obcordata; Dai medicine; Toxicity tests, acute; Kidney calculi

INTRODUCTION

Most of the world's population relies on traditional medicine for their healthcare needs.[1] However, many of the traditional medicinal plants in use have not been well studied. Therefore, to develop safe natural plant products, preliminary studies are necessary to evaluate possible risks such as undesirable side effects and to determine appropriate dosage levels and regimens to avoid overdosing or poisoning of patients.

Aspidopterys obcordata (A. obcordata), a woody liana belonging to the Malpighiaceae family, has many traditional uses. For example, the leaves are used in folk medicine for treatment of nephritis, renal calculus, urocystitis, and prostatitis.[2] A. obcordata is used most frequently and widely in the Dai minority hospital of Xishuangbanna. However, the remoteness of Xishuangbanna has resulted in only a few focused, basic theoretical studies on A. obcordata being performed to date. Only one study separated and identified 6 ingredients from A. obcordata and determined that the major effective constituents in A. obcordata appear to be friedelin and friedelin-3 beta-alcohol.[3]

Given A. obcordata's widespread use in the Dai minority hospital and prospective use for treatment of urinary calculi, our group has performed various studies addressing a resource survey, propagation methods, and microscopic authentication. Additionally, studies on A. obcordata pharmacology and efficacy are under way. However, there are no reported toxicity or side effect profiles for A. obcordata, and very little is known about its chemical composition. Thus, it is necessary to evaluate the safety and toxicity of A. obcordata to establish clinical safety and a premise for pharmacodynamic studies. The present study provides data on the safety of A. obcordata by examining the acute toxicity of an aqueous extract from A. obcordata orally administered to Sprague-Dawley rats.

MATERIALS AND METHODS

Preparation of the aqueous extract

The plant material was collected from Mengyang town, northeast of Jinghong city in the Xishuangbanna Prefecture, and authenticated by Professor Li Xuelan (Research Center for Pharmacology, Yunnan Branch, Institute of Medicinal Plant Development). The dried plant was ground and 100 g of the powder extracted with 1 L of distilled water for 1 h. The suspension was sequentially filtered through cheesecloth and filter paper. The filtrate was concentrated under reduced pressure using a rotary evaporator (Shanghai Ya Rong biochemistry instrument factory, Shanghai, China) to the desired consistency. The filtrate obtained was placed in an evaporating dish and concentrated in a vacuum compartment dryer (Shanghai Yi Heng scientific instrument Co., Ltd., Shanghai, China) at 50 ℃ until it was completely dry.

Laboratory animals

Male and female Sprague-Dawley rats of specific pathogen free grade, three-month-old, weighting (80 ± 20) g were purchased from the Laboratory Animal Center of the Academy of Military Medical Sciences [Beijing, China, Certificate of quality No. SCXK (Army) 2004-007]. The animals were kept in a specific-pathogen-free vivarium for at least 5 days prior to the experiments. All animals were maintained at a controlled temperature [(22 ± 2) ℃] under 12-h light/dark cycles and were allowed free access to food and water. The protocol of the study was approved by the Ethics Committee of the institute of medicinal plant development. All animal studies were performed according to the Guide for the Care and Use of Laboratory Animals from the Institute of Medicinal Plant Development of the Chinese Academy of Medical Sciences and the Peking Union Medical College.

Acute toxicity

The experimental procedures and protocols used in this study were designed and performed according to the World Health Organization guidelines for the evaluation of the safety and efficiency of herbal medicines[4] and the methods in report[5] for the testing of single-dose acute toxicity.

The rats were randomly assigned to control and treatment groups by random number table method: with 5 males and 5 females for a total of 10 rats in each group. The treatment group was administered the aqueous extract of A. obcordata at a single dose of 5000 mg/kg body weight,[6] whereas the control group received distilled water. Both treatments were administered through oral gavage using a volume of 2 mL.

The animals were observed and data were recorded at 1, 2, 4, and 6 h after the administration of A. obcordata and daily thereafter for 14 days. The visual observations evaluated changes in the skin, fur, eyes, and respiration, in addition to behavior. All rats were weighed once prior to treatment and then weekly, with the final weights recorded on the day of sacrifice. The amount of food and water consumed was also measured on Day 0, weekly, and at the end of the experiment.

On the fifteenth day, blood was drawn from all rats under anesthesia. Blood samples were analyzed for hema-