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CONTRIBUTION TO THE PHYTOMEDICINAL STUDY OF THE SOLID AND AQUEOUS EXTRACT OF Anthurium schlechtendalii KUNTH ROOT AGAINST LIVER DAMAGE IN A RAT MODEL

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Abstract

Plants have been used as a herbal treatment option for liver disease in alternative medicine. The current study was carried out to investigate the therapeutic potential of Anthurium schlechtendalii Kunth roots as a hepatoprotective or remission agent for liver damage. A preclinical study was carried out through oral administration of 4-tert-octylphenol (100 mg kg-1/day) as inducer of liver disease, and solid and aqueous extracts from the plant roots. The extracts were tested at doses of 125 mg kg-1/day and 1.8 mg mL-1/day, respectively, using a rat model in a 4-week experiment. Growth parameters (initial and final body weight, food intake, liquid consumption, liver weight) and liver function markers (aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) were determined. In addition, analysis of variance (one-way ANOVA) procedures, with a post hoc Tukey's multiple range test for comparison of means ($p < 0.05$), were performed. The study showed that, according to the lethal concentration (LC50) through the PROBIT transformation, the extract was non-toxic. The experimental model used, however, was not able to show liver function marker damage nor changes in growth parameters, so no statistically different results were found between the study groups (A, control; B, 4-tert-octylphenol; C, solid extract; D, solid and aqueous extracts; E, 4-tert-octylphenol plus solid extract; F, 4-tert-octylphenol plus solid and aqueous extracts). The method of toxic administration was not through direct oral dose but mixed in food, possibly producing a low intake of 4-tert-octylphenol thus not causing liver function marker damage. The need to continue and expand relevant research, to accumulate sufficient scientific knowledge and elucidate the efficacy of A.

schlechtendalii Kunth roots in the prevention, mitigation, or remission of liver damage, has been made evident by the results obtained.

Keywords: *Liver disease, Anthurium schlechtendalii Kunth roots, hepatoprotective action, phenolic compound, alternative medicine.*

Introduction

The liver is a complex organ that performs multiple functions. Its relationship with other organs and the metabolic pathways, as well as its detoxification capacity, derives from biotransformation of enzyme systems, such as the cytochrome P450 family (CiP450), which confers a critical role in health, and any deficiency in its physiology can cause complex disorders. Hepatotoxicity is a dysfunctional liver condition caused by drug administration, exposure to viruses and chemical agents (heavy metals, pesticides) and/or genetic factors [1,2]. Abnormal values of specific biomarkers are present under hepatotoxic conditions. As a result of an imbalance in cellular metabolism, the exposure of substances that interact with essential biomolecules leads to modifications at a structural and functional level [3]. The biochemical marker that commonly defines a hepatotoxic condition is elevation of liver enzymes such as alkaline phosphatase (ALP), aspartate aminotransferase (AST), and particularly alanine aminotransferase (ALT), reflecting hepatocellular damage [4]. Currently, liver disease is one of the leading causes of death in the world. In the European Union (EU), approximately 29 million people suffer from chronic liver disease [5]. Mexico's National Institute of Statistics and Geography reported that the incidence of hepatic diseases in Mexico increased, reaching 32,453 deaths [6]. Between 2010 and 2013, liver diseases represented the sixth highest cause of mortality in Mexico [7]. The number of xenobiotics involved in episodes of hepatotoxicity is increasing. The phenolic derivative 4-tert-octylphenol is a toxic and highly stable compound resistant to biological attack [8]. It has also been identified as an endocrine disruptor or xenoestrogen, which has implications for human health, the environment, and the food chain, particularly its hepatotoxic capacity [9,10].

Mexico is a country with outstanding biodiversity and many of the plants, one of the most important natural resources, are used in traditional medicine by Mexican herbalists [11]. *Anthurium schlechtendalii* Kunth (stone root), which belongs to the family Araceae, is mainly a tropical plant, with a great diversity of species in Asia and tropical America [12]. One hundred and twenty-one species and 18 genera of this plant found in Mexico are reported in the scientific literature. Araceae endemism in Mexico is high, mainly in the genus Anthurium, of which 26 of a total of 41 species are endemic [13,14]. Approximately 45% of the total Mexican species grow in the state of Veracruz [15].

There are reports that traditional medicine, particularly in China, offers remission of chronic kidney disease (CKD) through phytochemicals [16]. One species that has demonstrated such properties is *Anthurium schlechtendalii Kunth*. It has been reported that added to drinking water (root infusion), it has been used for symptomatic treatments of postpartum pain and spasmodic urinary tract disorders, and to control bleeding [17,18]. There are no phytochemical or phytopharmacological studies in the scientific literature on the preventive or remission effect of *A. schlechtendalii* Kunth on liver function. Stark, et al. [19], reported that the presence of antioxidants and phenolic compounds in the root and leaf extracts of *A. schlechtendalii* Kunth could be responsible for their anti-inflammatory potential. To ascertain its use in society and the possibility that *A. schlechtendalii* Kunth could be efficacious for the treatment of the disease mentioned above, this study aimed to evaluate either the preventive or remission effect of the aqueous extract of *A. schlechtendalii* Kunth (stone root) on hepatic damage induced by 4-tert-octylphenol, or both, in a murine model.