Evaluating the Effect of Methanolic *Achillea wilhelmsii* Extract on the Liver and Kidney Functions in Rats

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Abstract

Introduction: Extracts of *Achillea wilhelmsii* C. Koch are used as anti-inflammatory, antispasmodic, antihypertensive, and topical anti-dandruff, and skin moisturizer. Given the increasing consumption of this medicinal plant among the people, it is necessary to conduct laboratory research in order to know more about its useful properties and possible harms.

Objective: To evaluate the effect of methanolic extract of *Achillea wilhelmsii* on the liver and kidney functions in rats

Materials and Methods: Twenty male Wistar rats were randomly divided into 4 groups (each group 5) and were studied for 7 days under the effect of 50, 100 and 150 m/kg herbal extracts. Serum levels of liver and kidney biochemical parameters were then measured. Significant differences between the control and treatment groups were analyzed by t-test at the level of $P<0.05$, using SPSS 21 software.

Results: Oral administration of *A. wilhelmsii* extract at doses of 100 and 150 mg/kg significantly increased Alanine aminotransferase (ALT) and Aspartate Aminotransferase (AST), compared to the control group ($P<0.05$). Also, Alkaline phosphatase (ALP) and Creatinine showed a significant increase only at the dose of 150 mg/kg, compared to that in the control group. But bilirubin in combination with ALP and alanine ALT at 50 mg/kg showed a significant decrease, compared to the control group ($P<0.05$). Recipients of other doses of extract did not show any significant differences.

Conclusion: According to the findings of this study, oral administration of *A. wilhelmsii* extract at 50 mg/kg dose significantly reduced liver and kidney enzymes, but at higher doses it did conversely. In order to be more certain about the protective or toxic effects of the plant extract on the liver and kidney, the histopathological effects of different extracts of this plant need to be studied further.

Keywords: *Achillea* / Kidney/ Liver /Methanolic

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Extended Abstract

Introduction: *Achillea wilhelmsii* C. Koch is a plant from Compositae (Asteraceae), 15 to 40 cm tall (1). This plant grows in Iran both in tropical and cold regions, with its natural habitats in the provinces of South Khorasan, Isfahan, Markazi, Zagros Mountains (Ilam, Fars, etc.), including Kohgiluyeh and Boyerahmad (1,2). Extracts of *Achillea wilhelmsii* C. Koch are used as anti-inflammatory, antispasmodic, antihypertensive, and topical anti- dandruff, and skin moisturizer. Due to the increasing consumption of this medicinal plant among the people, it is necessary to conduct laboratory research in order to know more about its useful properties and possible harms (3).

Objective: To evaluate the effect of methanolic extract of *Achillea wilhelmsii* on liver and kidney functions in rats

Materials and Methods: Adult male rats (7 weeks old), weighing approximately 210 to 230 grams, were obtained from the Pasteur Institute of Iran, kept for 10 days in hygienic conditions, 12 hours of light and 12 hours of darkness, humidity and temperature to adapt to the conditions of the pet for a period of time. The animals had free access to water and food.

100 grams of the powder prepared from the aerial parts of the plant was transferred to a percolator glass container and a liter of methanol was added to it, to completely dissolve the solvent on the powder and was concentrated by vacuum distillation device at 45 C. To prepare the oral solution, 50, 100 and 150 mg of dried extract per 5 ml of physiological serum per kilogram of solution (1 mg/kg) and 1 ml of this solution were prescribed. A liter of 200 grams of cattle was fed to the animals.

Twenty male Wistar rats were randomly divided into 4 groups (each group 5) and the groups were studied for 7 days under 50, 100 and 150 m/kg herbal extracts. Serum levels of liver and kidney biochemical parameters were then measured. Significant differences between the control and treatment groups were analyzed by t-test at the level of $P<0.05$ using SPSS 21 software.

Results: Oral administration of *A. wilhelmsii* extract at doses of 100 and 150 mg/kg significantly increased Alanine aminotransferase (ALT) and Aspartate Aminotransferase (AST), compared to the control group ($P<0.05$). Also, Alkaline phosphatase (ALP) and Creatinine (Cr) showed a significant increase only at the dose of 150 mg/kg, compared to the control group. But bilirubin(BR) in combination with ALP and alanine ALT at 50 mg/kg showed a significant decrease, compared to the control group ($P<0.05$). Recipients of other doses of extract did not show any significant differences (Table 1).

The results of a liver and kidney histopathology study showed that only in the group receiving the extract with a dose of 150 mg / kg, significant changes were observed, and no significant changes were evident in other doses. Mild hepatitis and swelling of the liver and mild fat degeneration were observed. The size and shape of hepatocyte nuclei were larger than normal in most mice receiving a dose of 150 mg/kg and the contents of the nucleus contained abnormal chromatin in chunks and clumps. Hypertension indicates the involvement of the vascular system and blood in the liver. In all the rats receiving a dose of 150 mg/kg, similar prophylactic substances were found inside the tubules, swelling of the tubules, closure of the central tubular ducts, and blood clots in the cortex and medulla indicating damage to the glomerulus.

Conclusion: Elevated serum levels of liver enzymes (ALP, ALT, AST) can be a sign of liver toxicity, bile duct obstruction, hepatic necrosis, destruction of hepatocyte membranes, malfunction of cell membranes, and cell leakage. There was also a significant increase in ALP at a dose of 150 mg / kg and a normal BR at this dose. The study seemingly shows that the plant is highly toxic and that it affects the epithelium of the bile ducts and causes cholestasis. A significant increase in Cr at a dose of 150 mg / kg compared to the control group was seen. In this study, we can attribute the protein catabolism to hypolemia and it is not necessarily suggestive of kidney damage.

According to the findings of this study, oral administration of *A. wilhelmsii* extract at 50 mg/kg dose significantly reduced liver and kidney enzymes but at high doses, it significantly increased them. In order to be more certain about the protective or toxic effects of the plant extract on the liver and kidney, the histopathological effects of different extracts of this plant need to be studied further.

Table 1: Effect of methanolic extract of *A. wilhelmsii* on biochemical parameters of rats

The (*) in the table indicates a significant difference (P <0/05), compared to the control group.

Biochemical Parameters / Groups	ALP (U/L)	ALT (U/L)	Cr (mg/dL)	BR (mg/dL)	AST (U/L)
Controls	387/4±38	73/20±8/34	0/48 ± 0/09	0/36± 0/01	**191/15±25/41**
۵۰ Mg/kg	372/12 ±37/39*	69/20±11/9*	0/45 ± 0/04	0/35± 0/01*	**159/26 ± 46/97**
۱۰۰Mg/kg	439/02±138/49	91/36±10/28	0/47 ± 0/06	0/37 ± 0/06	**219/69±17/75**
۱۵۰Mg/kg	473/2 ±47/51*	219/41±15/93*	0/51 ± 0/07*	0/40± 0/02	**344/38±12/98***

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