

بسم الله الرحمن الرحيم

**Sudan University of Science and Technology**  
**College of Graduate Studies**

**Immunotoxicity of *Convolvulus arvensis***  
**(Binweed)**

**in**

**Sheep and Rats**

**دراسة السمية المناعية لنبات الكونفلفيولس أرفينسس (البنويد)**  
**في الأغنام والفئران**

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## **DEDICATION**

**This thesis is dedicated to my late  
father, mother, brothers and sister  
and to my wife and children, with  
love.**

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## المخلص بالعربي

يعتبر نبات البنويد (الفضاخ) من النباتات الزاحفة التي تنتشر في الشرق الأوسط. وربما احتاجت الحيوانات للأكل منه في أوقات الجفاف . لذا كان من المفيد إجراء دراسة عن سمية النبات في الأغنام والفئران.

في البداية تم تقسيم الأغنام والفئران إلى ثلاثة مجموعات . تم استخدام مجموعة كشاهد وتم استخدام المجموعتين الأخرين في التجربة حيث تم اطعام إحداهما بنبات الفضاخ وحده وتم اطعام المجموعة الأخرى بنبات الفضاخ مخلوط بنسبة 50 % مع نبات الرودس . لقد تم ملاحظة ان الحيوانات نفقت او تسممت بعد مضي 7 أيام من إطعام الفضاخ . واشتملت الأعراض الاكلينيكية على جحوظ العين وبهتان الغشاء المخاطي وزيادة في سرعة التنفس وترنح وتشنجات واسهال. ولقد اشتملت التغيرات الظاهرية والمجهرية على تراكم الغازات في الأمعاء ،احتقان وودمة ونزف لأعضاء داخلية كثيرة .

إن انخفاض تركيز الهيموجلوبين ونسبة خلايا الدم المتراصة وعدد كريات الدم الحمراء دل على حدوث أنيميا في الأغنام. لم تلاحظ أي أعراض على الأغنام التي تم إطعامها بالفضاخ مخلوط مع الرودس. وفي تجربة أخرى تم ملاحظة إن إطعام الفئران بالفضاخ في جرعة مقدارها 0.5 جم ولدة 10 أيام تسبب في نقصان في تركيز البروتين ونشاط إنزيمات بعض أيض الأدوية والسموم في الكبد. لقد تم الحصول على مستخلص كحولي وآخر مائي لنبات الفضاخ حيث تبين أن الجرعة السمية الوسطية للمستخلص الكحولي في الفئران هي  $5 \pm 160$  ملجرام للكيلو جرام وإن الجرعة السمية للمستخلص المائي هي  $6 \pm 410$  ملجرام للكيلو جرام مما يقود إلى الاستنتاج بأن سمية الفضاخ في الأغنام والفئران ربما نتجت من سمية المستخلص الكحولي . لقد تم تثبيط حركة الأمعاء والإسهال وتكوين الماء في الأمعاء بسبب زيت الخروع بواسطة المستخلص الكحولي للفضاخ بجرعة مقدارها 0.1 من الجرعة السمية الوسطية مثلما يحدث مع الأتروبين . إن حقن المستخلص المائي للفضاخ بجرعة مقدارها 0.1 من الجرعة السمية الوسطية في الغشاء التنوري للفئران قد تسبب في زيادة كريات الدم الحمراء ونسبة الخلايا الليمفاوية وتنشيط وظيفة البلعمة من خلايا الشبكة الاندثولية وإيقاف التثبيط على المناعة بواسطة الديكساميثازون . لقد تسبب حقن المستخلص

المائي على زيادة بعض وسائط المناعة مثل تركيز هرمون اللبتين ونيوبترين  
والأمينوجلوبولين ونشاط انزيم اليسوزوم.



تشير هذه النتائج إلى أن أوراق نبات الفصاخ تحتوي على مستخلص كحولي شبيه بالأتروبين وهو سام للحيوانات ومستخلص مائي يزيد من وظيفة المناعة. وإن النبات يعتبر سام للحيوانات لذا يجب منع الحيوانات من أكله.

## ABSTRACT

*Convolvulus arvensis* (Binweed) is a creeping weed widely distributed in the Middle East. During drought animals may be forced to consume the plant. Therefore, this study was carried out to investigate the toxicity of the plant in sheep and rats.

Initially sheep and rats were divided into 3 groups. One group served as controls and fed Rhodes in case of sheep and rat diet in case of rats. The other groups were fed either exclusively on binweed leaves or on 50 % binweed combined with Rhodes or rat diet. Sheep or rats either died or intoxicated by the plant 7 days post dosing with clinical signs included dilated pupil, pale mucous membrane, respiratory distress, ataxia, convulsion and diarrhea. Macroscopic and microscopic lesions included gaseous distended intestine, congestion, oedema and hemorrhage of many organs. Decreased Hb, PCV and RBC count were suggestive of anemia. Elevation of enzymes indicating liver and kidney dysfunction also occurred.

Animals fed 50 % binweed did not develop any signs of toxicity. Oral administration at a dose of 0.5 g rat of binweed for 10 days caused decreased protein in liver homogenate and inhibited the activity of phase-1 drug metabolizing enzymes. Successful extraction of the plant yielded alcoholic and aqueous fractions with LD<sub>50</sub> of 160 ± 5 mg / kg and 410 ± 6 mg / kg , respectively, suggesting that the binweed toxicity occurring in sheep and rats may possibly be due to alcoholic fraction. Oral administration of 1/10 LD<sub>50</sub> of alcoholic extract blocked diarrhea, enteropooling and intestinal transits induced by castor oil, comparable to that of atropine. Intraperitoneal injection of 1/10 LD<sub>50</sub> of aqueous extract to rats significantly increased total leukocytes and percentage lymphocyte, enhanced the phagocytic function of reticular endothelial system and blocked immunosuppressive effect produced by

dexamethasone. Furthermore, the aqueous extract significantly increased the concentration of some immunomodulators such as leptin, neopterin, immunoglobulins and lysosomal enzyme activity.

These results show that binweed leaves contain alcoholic soluble atropine-like fraction that was toxic to animals and water soluble fraction that was immunostimulant. The whole plant is toxic to animals, therefore care should be taken that animals are not allowed to eat the plant.

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