

Egyptian Dermatology Online Journal

Volume 7 Number 2

Anti-lice activity of *Abrus Precatorius* LINN (FAM -Fabaceae) seeds oil

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Egyptian Dermatology Online Journal 7 (2): 4

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Submitted: November 1, 2011

Accepted: November 30, 2011

Abstract

Background: Infection by head lice is an annoying dermatological disease . Pediculocidal drug resistance developed by head louse laid the foundation for research in exploring novel anti-lice agents from medicinal plants

Material and method: In present study petroleum ether (60-80) °C fraction of *A. precatorius* seeds were tested against the head louse i.e. *Pediculus humanus capitis*. Pediculocidal activity was determined by filter paper diffusion method.

Results: The findings revealed that petroleum ether extracts possess excellent anti-lice activity .In 15 % concentration seed oil is able to kill 100% lice and 10 and 15 % concentration of seed oil makes nits unable to survive, results were well comparable with standard (benzyl benzoate 25% w/v) as its 10% and 20% concentrations are able to kill 100% lice and deactivated nits. These results showed the potency of petroleum ether (60-80) fraction of *A. precatorius* seeds against head louse.

Key words: - Lice, *A. precatorius*, seeds

Introduction

Pediculus humanus capitis, known as the human head louse, infestation is a major concern in public health-associated problems. Head lice are ectoparasites and its infestation due to unhygienic conditions has negatively affected the society back to the earliest *Homo sapiens*. The condition is distributed around the world invading various ethnic groups with no restrictions of sex and socioeconomic status [1]. This lack of efficacy is due to the emergence of resistance by the head louse to synthetic compounds and researchers were aimed on the search of new substitutes to synthetic ingredients, such as phytoconstituents obtained from plant sources [2,3].

Abrus precatorius (Fabaceae) is a woody climber distributed widely throughout India. The plant is traditionally used for the treatment of sore tongue and it also has diaphoretic action. Seeds of *Abrus precatorius* are commonly used as purgative, emetic, aphrodisiac and in nervous disorder in traditional and folk medicines. *A. precatorius* seeds are known for their toxicity but petroleum ether extract do not contain toxic principle [4].

Materials and methods

a. Procurement and identification of plant material

The plant material *A. precatorius* were procured in the month of June from Corbett National Park, Ramnagar (Uttarakhand, India) and identified by Dr. D.V. Amla, Scientist G at National Botanical Research Institute, Lucknow (Uttar Pradesh, India) under voucher specimen no NBRISOP-202 and a specimen was preserved there for further references.

Drying of the powdered material: The plant materials were dried under the shade. Then it was powdered and dried in oven at 30-40 °C.

b. Preparation of extract

Coarsely powdered drug was taken in a Soxhlet apparatus and extracted with petroleum ether (60-80°C) till complete extraction. The solvent from the extract was recovered under reduced pressure and its yield was 1.6 % w/w.

c. Chromatographic characterization

For experiment, petroleum ether seed extract of *A. precatorius* was characterized by Thin layer chromatography (TLC) on precoated silica gel G plate(10×10) (E.Merk,Germany) developed in toluene: ethyl acetate (95:5 v/v) as mobile phase gave best resolution after derivatization with Lieberman burchard reagent.

Steroidal component was present in this as proved by phytochemical analysis.

d. Isolation

The oil fraction was separated from extract obtained as unsaponifiable fraction on addition of sodium hydroxide by separating funnel.

e. Collection of head lice

Adults, nymphs, and nits of *P. humanus capitis* were collected from children between the age group of 10-13 by combing through sections of the scalp using a clean narrow toothed comb. After combing, the lice

were carefully removed from the teeth of the comb into plastic boxes. All the subjects had not been exposed to any anti-lice products for the preceding 3 months.

f. Anti-lice activity

Extract was tested for pediculocidal activity by filter paper diffusion method [5]. Extract and benzyl benzoate were dissolved separately in distilled water to obtain 3 different concentrations (5%, 10%, and 20%). After careful selection under a dissecting microscope, the adults and nymphs were identified and separated. All the test organisms in a ratio of 3/2 (adult/nymph) were divided into 7 groups (5 lice each) and were placed on a filter paper at the bottom of petri dish and kept open. A volume (0.5 ml) of each test samples was poured on the test organisms and allowed to spread as a thin layer of 4 cm². Group 1 was treated with 0.5 ml distilled water and served as control. Group 2 to group 7 received 0.5 ml of various concentrations of extract and benzyl benzoate. All the Petri dishes were set aside for 1 hr in a dark chamber at $26 \pm 0.5^{\circ}\text{C}$ and $70 \pm 1\%$ humidity [6].

At the end of 1 hr, the dishes were taken out and 0.5 ml of distilled water was applied and further placed in the chamber under the condition mentioned above. After 18 hr, the dishes were observed under a dissecting microscope for any possible movement of lice and absence of any movement were considered dead [7]. All the treatments were performed in triplicate (Table 1).

g. Ovicidal effects

The ovicidal activity was tested by placing 5 brownish oval eggs with an unbroken operculum on the filter paper (Whatmann No. 1; 6 cm diameter) placed in the bottom of each petri dish. Then, 0.5 ml of each test solution and control were applied on the nits. All the dishes were then incubated

in a dark chamber at $26 \pm 0.5^{\circ}\text{C}$ for 14 days. To maintain the moisture, 0.1 ml of distilled water was added at 48 hr interval. Hatching of eggs were monitored under a microscope and the percentage of emergence, i.e., partially hatched nits, were observed, and the findings were recorded [6]. Each treatment was replicated 3 times (Table 2).

Results

Test sample	Concentration	Average Mortality Percent
Distilled water	-	9.4
Petroleum ether extract (0.5 ml)	5	50.5
	10	89.3
	15	100
Benzyl benzoate	5	65
	10	100
	20	100

Table 1 :Effects of *A. precatorius* seed extracts against *Pediculus humanus capitis* adults and nymphs Above data shows that in 15 % concentration seed oil is able to kill 100% lice

Test sample	Concentration	Emergence	
		Day 6	Day 14
Distilled water	-	82.4	93.2
Petroleum ether extract (0.5 ml)	5	20.3	5.8
	10	0	0
	15	0	0
Benzyl benzoate	5	7	0
	10	0	0
	20	0	0

Table 2 :Effects of *A. precatorius* seed extracts against *Pediculus humanus capitis* nits

Discussion

The use of *A. precatorius* extract for controlling lice infestations has been authenticated from the excellent results obtained after screening for potential anti-lice and ovicidal activity. Oils from natural sources, such as eucalyptus, marjoram, spearmint, peppermint, sage, rosewood, clove bud, and cinnamon bark have exhibited significant pediculocidal activity in filter paper bioassays [8,9,10,11]. Another study carried out on school children revealed that 20% petroleum ether extract of custard apple seeds killed 95.3% of head lice [12]. The findings of this study showed excellent anti-lice and ovicidal activities of petroleum ether extract of *A. precatorius* which may be due to the presence of sterol derivatives responsible for the enhanced penetration and bioavailability of oil components into the body of louse. Penetration of extracts into the alimentary tract of lice could be ignored since all the extracts was applied on lice placed on the filter paper which also subsequently avoided immense dissemination of active constituents into the cuticle when the compound is directly applied to the insect skin [13]. Additionally, the lice was not exposed in an enclosed environment with the petri dish kept open which limits the possibility of volatile agents getting absorbed through the spiracles. For synthetic pediculocidal agents, the residue which remains in the head even after rinsing with water gives an enhanced control against lice but also noted for the development of resistance for lice [14,3]. Natural extracts from medicinal plants has been noticed for its safe and effective use, and appearance of resistance patterns were minimal due to its different mode of action [15,16] which greatly supports the safe use of *A. precatorius* extracts as a potent anti-lice agent.

Eradication of lice would be complete if the products used for pediculocidal activity also delays nymph emergence and potentially kill the nymph. Extracts of *A. precatorius* succeeded in delaying the emergence of nymphs, and its oily nature may help to detach nits from the hair before hatching. 15%

concentration of petroleum ether extract of *A. precatorius* exhibited the maximum pediculocidal effects and completely inhibited nymph emergence at 2 different concentrations (10% and 15%). Hence, the results obtained from this research present a promising scenario for using *A. precatorius* seeds extract as an effective alternative for treating human head lice.

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