

Chromatographic evaluation and anthelmintic activity of *Eucalyptus globulus* oil

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ABSTRACT

In world Helminthes infections are the most widespread of all the infections in humans. The morbidity due to parasitic diseases has been increasing in our population. The gastrointestinal helminthes become resistant to the currently available anthelmintic drugs. Anthelmintic substances having considerable toxicity to human beings are present in foods derived from livestock, posing a serious threat to human health. Due to this, there is a need to derive new chemical substances from natural sources, for helminthes control. In this study, volatile oil isolated from *Eucalyptus globulus* Labill was evaluated for its anthelmintic activity on adult Indian earthworms, *Pheretima posthuma*, which have anatomical and physiological resemblance with the intestinal roundworm parasites of human beings. In concentrations of 0.05, 0.01 and 0.15 ml/ml, respectively, all the oil samples showed potent anthelmintic activity as compared to that of the standard drug albendazole at a concentration of 10 mg/ml.

Key words: Anthelmintic, *Eucalyptus globulus*, eucalyptus oil, *Pheretima posthumag*

INTRODUCTION

In world Helminthes infections are the most widespread of all the infections affecting humans. The morbidity due to parasitic diseases has been increasing in our population.^[1] The gastrointestinal helminthes become resistant to the currently available anthelmintic drugs. Therefore, treatment of helminthes diseases has become difficult.^[2] Anthelmintic substances having considerable toxicity to human beings are present in foods derived from livestock, posing a serious threat to human health.^[3] A new lead for helminth control is greatly needed and has promoted studies of traditionally used anthelmintic plants which are generally considered to be very important sources of bioactive substances.^[4]

Eucalyptus globulus Labill (family Myrtaceae) is a lofty tree of about 90 m in height. Leaves are febrifuge, carminative, stimulant, expectorant, antiseptic, antimalarial and anthelmintic. Eucalyptus oil has powerful antiseptic and

disinfectant properties. It increases the flow of saliva, gastric and intestinal juices and increases the digestion and appetite.^[5,6]

Bark of *E. globulus* contains ellagitannins, methyl and glycosyl derivatives of ellagic acid and free ellagic and gallic acids, gallotannins and catechin.^[7-10] Essential oil from this species has a therapeutic application in the treatment of pulmonary infections by inhalation^[11] and the monoterpene extracted from *Eucalyptus citriodora*, *E. globulus* and *Eucalyptus tereticorni* exhibits antibacterial activity.^[12] Besides antibacterial activity, the essential oil from eucalyptus shows analgesic and anti-inflammatory effects.^[13] Phytochemical analysis has established that the genus *Eucalyptus* contains monoterpenes.^[14] Two monoterpene glycosides, conjugated with gallic acid globulusin A and B, together with four known compounds, cypellocarpin A, eucaglobulin, cuniloside and (1S, 2S, 4R)-trans-2-hydroxy-1,8-cineole β -D-glucopyranoside, were isolated from hot water extracts of the leaves of *E. globulus*.^[15] The aim of this research was to study chemical composition and anthelmintic property of the volatile oil from the leaves of *E. globulus*.

MATERIAL AND METHODS

Plant material

The leaves were collected from Baramati region of Dist.

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Pune and were authenticated by Prof. R. B. Deshmukh, Head, Department of Botany, Shardabai Pawar Mahila Mahavidyalaya, Shardanagar.

Isolation of Essential Oil

The essential oil was isolated from the fresh leaves by hydrodistillation in a clevenger-type apparatus, yielding essential oil 0.53% w/v.

Evaluation of Anthelmintic Activity

Indian adult earthworms (*Pheretima posthuma*) of 3–5 cm length and 0.1–0.2 cm width were used for anthelmintic activity because of their anatomical and physiological resemblance with the intestinal roundworm parasites of human beings.^[16,17] The earthworms were divided into four groups containing five earthworms in each group. Oil was dissolved in water using tween 80. All the test samples and the standard drug were freshly prepared before starting the experiment. The solution of oils and standard solution were poured in petridishes. All the earthworms were washed in normal saline solution before they were released into petridish containing 10 ml solution of *E. globulus* oil in concentrations of 0.05, 0.1 and 0.15 ml/ml, respectively, and albendazole (10 mg/ml). The time taken for the worms to get paralyzed and killed was noted. All readings were expressed as mean and standard error of mean (SEM) of three animals in each group.^[18]

Evaluation of Volatile Oil

Volatile oil was evaluated for optical rotation and refractive index as per the standard procedure.^[19]

Thin layer chromatography

Thin layer chromatography was performed using silica gel G as the stationary phase, toluene-ethylacetate (97:3) as the mobile phase and vanillin-sulfuric acid as the spraying reagent.^[20]

RESULTS

Essential oil from *E. globulus* contains 1,8-cineole as the major component^[21,22] and is used in the treatment of pulmonary infections^[11] and also exhibits antibacterial activity.^[12] The result of the present study reveals that *E. globulus* oil in concentrations of 0.05, 0.1 and 0.15 ml/ml showed significant anthelmintic activity as compared to the standard drug albendazole at a concentration of 10 mg/ml, as shown in Figure 1. *E. globulus* oil showed anthelmintic activity in a concentration-dependent manner. Evaluation of *E. globulus* oil showed an optical rotation of +0.8° and a refractive index of 1.4554. Chromatographic study confirmed the presence of borneol, linalool, cineol, geranyl acetate, anethol, saffrol as the phytoconstituents

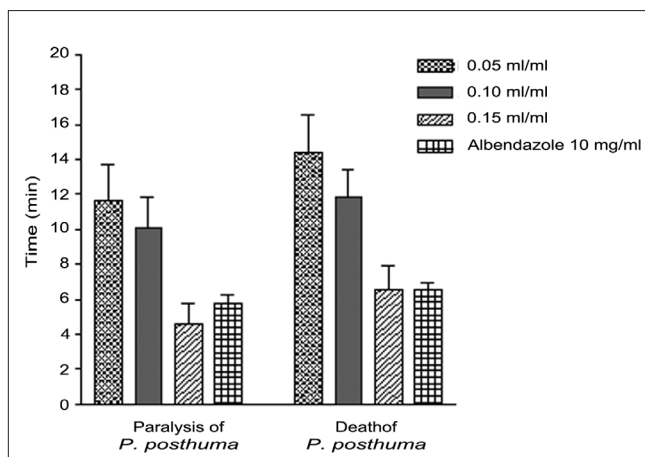


Figure 1: Anthelmintic activity of *Eucalyptus globulus* oil

of eucalyptus oil, as shown in Table 1.

DISCUSSION

An Indian adult earthworm (*P. posthuma*) has anatomical and physiological resemblance with the intestinal roundworm parasites of human beings.^[16,17] Result indicates that time taken for albendazole for causing paralysis and death of *P. posthuma* was 5.82 ± 0.466 and 6.54 ± 0.429 , respectively, whereas *eucalyptus* oil at a concentration of 0.15 ml/ml causes paralysis and death at 4.598 ± 1.151 and 6.57 ± 1.374 , respectively. So, the present investigation concludes that *E. globulus* oil has anthelmintic potential due to the presence of borneol, linalool, cineol, geranyl acetate, anethol, saffrol as phytoconstituents.

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Table 1: Thin layer chromatography of *E. globulus* oil

Spots from bottom	R _f values	Phytochemical constituents
1	0.266	Borneol
2	0.312	Linalool
3	0.4666	Cineol
4	0.632	Geranyl acetate
5	0.785	Anethol
6	0.814	Saffrol

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