SINET: Ethiop. J. Sci., 26(2):151–153, 2003
 ISSN: 0379–2897

Short communication

TOXICITY STUDY IN MICE OF RESINS OF THREE *COMMIPHORA* SPECIES

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ABSTRACT: Acute toxicity studies of crude extracts of resins of *Commiphora myrrha*, *C. guidottii* and *C. erlangeriana*, and pure compounds isolated from *C. erlangeriana* were conducted on Swiss albino mice. The extract from *C. erlangeriana* had a mean LD_{50} of 410 mg/kg body weight. However the extracts from *C. myrrha* and *C. guidotti* were not toxic at the doses tested. The pure compound isolated from *C. erlangeriana*, erlangerin D (**1**) demonstrated a mean LD_{50} of 140 mg/kg body weight. On the other hand erlangerin A (**2**) was not toxic to the mice at even four times the LD_{50} value of erlangerin D (**1**).

Key words/phrases: ***Commiphora erlangeriana, C. guidotti, C. myrrha,* myrrh, opopanax**

INTRODUCTION

Several species belonging to the genus *Commiphora* (Burseraceae) are distinguished by their ability to produce aromatic and medicinal resins which have been used since ancient times in Africa and many middle eastern countries. Ethiopia is endowed with several *Commiphora* species (Vollesen, 1989). *C. myrrha* (Nees) Engl. and *C. guidottii* Chiov. produce resins commonly known as myrrh and opopanax, respectively. Myrrh is known in Amharic as *Kerbe* and in Somali as *Dhidin.* Opopanax also known as scented myrrh is called in Amharic as *Abeked,* in Somali as *Habak Hadi* and in Oromifa as *Hanketa.*

Both myrrh and opopanax are well known traditional medicines not only for human use but also to treat maladies of cattle and camels. Myrrh is smoked to repel snakes while opopanax is used as a cure for diarrhea. Claeson (1990) observed that in Somali traditional medicine *ca.* 5 g of crushed opopanax resin is stirred in about one litre of water and the whole preparation is taken orally. Myrrh and opopanax are important items of commerce because their essential oils are used for fragrance purposes and in aromatherapy. We have recently reported the result of the analysis of the essential oils of myrrh, opopanax and frankincense (Baser *et al.,* 2003).

During a field study in the Ogaden region of Ethiopia we came across a unique resin called locally as *Dhunkal* that is produced by *Commiphora erlangeriana* Engl. It is common knowledge that the resin is used to poison and kill some omnivorous wild animals such as hyena. However, we do not know the amount given to poison the animals.

The structures of the main compounds present in *Dhunkal* resin were reported recently by our group (Aman Dekebo *et al.*, 2002). Subsequently Solomon Habtemariam (2003) reported the cytostatic and cytotoxic properties of these compounds.

We report here results of comparative toxicity studies on mice carried out using crude extracts of the three resins namely *C. myrrha* (myrrh), *C. guidotti* (opopanax) and *C. erlangeriana* (*Dhunkal*). The toxicity of two pure compounds of *C. erlageriana* namely erlangerin A and D were also studied in the course of this work.

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MATERIALS AND METHODS

Plant material

Resins as well as respective voucher specimens were collected from Bulagere near Gode, Ogaden Region, Ethiopia in October 1997. The plants were identified by Dr. Kaj Vollesen, Kew Botanic Gardens, U.K. and specimens were deposited at the National Herbarium, Addis Ababa University, Ethiopia with voucher numbers: *C. myrrha* (072825), *C. guidottii* (072781) and *C. erlangeriana* (072799).

Extraction and isolation

The powdered resin (55 g) of *C. erlangeriana* was extracted with MeOH/EtOAc (1:1) by percolation for 24 h. Removal of the solvent from the extract under reduced pressure gave 28 g gummy material. The extract (7 g) when subjected to column chromatography over silica gel (230–400 mesh, 30 g) and eluting with n-hexane/$CHCl_3$/EtOAc of increasing polarity yielded compounds **1** and **2** (Fig. 1) as described recently by our group (Aman Dekebo *et al.*, 2002).

The resin (60 g) of *C. myrrha* was ground and extracted by percolation in petrol (40–60°C) using sonic bath at room temperature for 30 min. The solvent was removed under vacuum, yielding light yellow oil (11 g, 18%). Similarly extraction of the resin of *C. guidottii* (50 g) with hexane yielded (3 g, 6%) yellowish extract.

Test animals

Swiss albino mice (30 to 40 g) were used for the study. They were obtained from the animal house of the Department of Biology of the Addis Ababa University, housed at 23–25°C and given a standard diet and tap water ad labium.

Acute toxicity

The crude extracts of *C. erlangariana, C. guidotti* and *C. myrrha* from each species and compounds **1** and **2** isolated from *C. erlangeriana* were taken up separately in distilled water and given ad labium to each mouse in different doses.

Acute toxic effect on the mice were observed over 24 h period and mice alive or dead were counted. There were 49 treated and 11 control mice for the experiments. The dose was given based on body weight of the mice.

Statistical analysis

SPSS version 10 for windows was used to calculate the means and standard deviations of the resin doses.

RESULTS AND DISCUSSION

The extract of *C. erlangeriana* showed a mean LD_{50} value of 410 mg/kg body weight. Compound **1** had a mean LD_{50} of 140 mg/kg body weight. On the other hand, compound **2** did not kill the mice at about four times (550 mg/kg) the mean LD_{50} of compound **1**. This result indicates that the toxicity of the *Dhunkal* resin is attributable mainly to compound **1**.

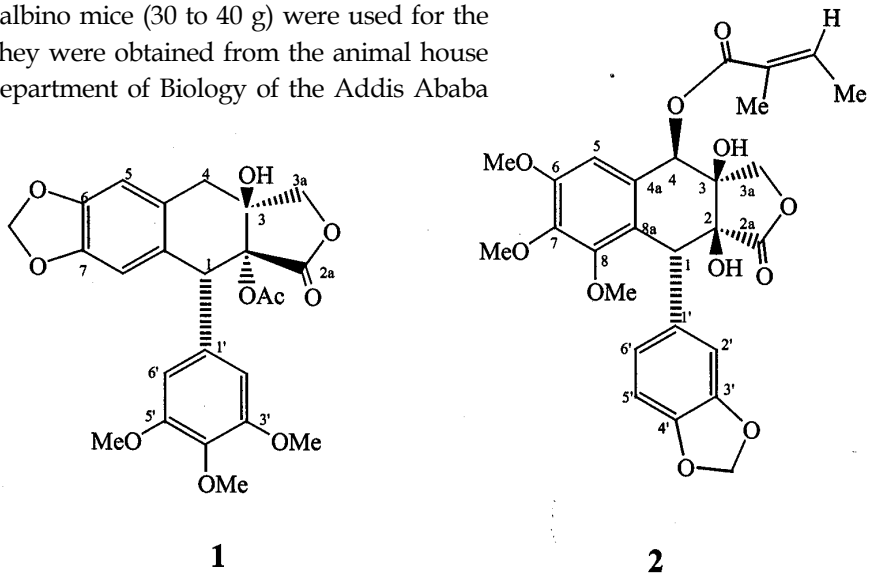

Fig. 1. Structure of erlangerin D(1) and erlangerin A(2).

The above results are also significant because of the report by Solomon Habtemariam (2003), that showed erlangerin D (**1**) to have a cell growth inhibitory activity comparable to the well known anti-cancer compound podophyllotoxin, while erlangerin A (**2**) was much less active.

The non-polar extracts of the resins of *C. guidotti* and *C. myrrha* did not show toxicity at mean doses of 1.2 g/kg and 0.96 g/kg body weight, respectively. The treated mice were not different from the control mice in their behaviour and activity.

The solvents for extraction were chosen based on knowledge of the chemistry of the extracts and previous biological studies. The toxicity of the water extracts of the resin of *C. myrrha* was investigated recently by Rao *et al.* (2001) and the pharmacology of the water extract of the resin of C. *guidotti* was reported by Claeson (1990). As there are many types of compounds present in the non-polar extracts of the above two resins, we decided to investigate the toxicity of these extracts. However in the case of *Dhunkal*, not much could be extracted with hexane and therefore a more polar solvent (MeOH/EtOAc, 1:1) was used to prepare the extract for the toxicity study.

The above results complement the report of Rao *et al.* (2001) where the water extract of the resin of C. *myrrha* was found to exhibit no visible signs of toxicity on mice even at a dose of 3 g/kg.

The gross observation of the pathophysiological effect of *Dhunkal* extract demonstrated on the mice was general inactivity and final death with no clear external abnormal change seen. No dissection was done to check internal organ damage since the objective of the experiment was to determine acute toxicity effect of the resins.

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