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SCREENING OF TRADITIONALLY USED ENDEMIC SOQOTRAEN PLANTS FOR CYTOTOXIC ACTIVITY

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Abstract

Thirty extracts obtained from 10 endemic plant species belonging to 8 plant families used in the traditional medicine in Socotra have been tested for cytotoxic activity against FL-cells. Extracts of *Eureiandra balfourii* and *Commiphora ornifolia* showed the strongest activity against FL-cells with IC_{50} < 10 µg/ml and 39.3 µg/ml respectively.

Key words: Cytotoxicity, Soqotra, Fl-cells

Introduction

Experts estimate that hundred of families of plants, occur in the island Soqotra. More than 800 plant species have been recorded to grow on the Island, of which 307 species are considered to be endemic (Miller and Morris, 2004). Soqotra represents a precious natural treasure of new pharmacologically active compounds for pharmaceutical industry, however, biological activities of Socotraen plants have not been thoroughly investigated (Ali and Lindequist 2005; Mothana and Lindequist 2005; Mothana et al 2006; Ali et al unpublished). This work reports the first attempt to study the cytotoxic activity of medicinal plants of the island Soqotra.

Materials and Methods

10 plants were collected from different parts in the island Soqotra (Table1) in March 2005 were authenticated at the Botany department, Faculty of Science, Aden University, Yemen; Voucher specimens of the plant material were deposited in Pharmacognosy Unit, Aden University. Air-dried and ground plant material (10 g) was extracted at room temperature successively with chloroform (100 ml x 4), MeOH (100 ml x 4) and distilled H_2O (100 ml x 4). The extracts were filtered and evaporated to dryness under reduced pressure at 40 °C; the residues obtained were stored in refrigerator until used.

Cytotoxicity assay

The cytotoxicity was measured by the neutral red uptake assay (Lindl and Bauer, 1989) using FL-cells, a human amniotic epithelial cell line (Hilgenfeld et al., 1979). Only living cells are able to manage the active uptake of neutral red. FL-cells were cultivated in a 96 well micro titer plate (10^5 cells/ml EAGLE-MEM, Sifin, Berlin, D, 150 µl/well) at 37° C in a humidified 5 % carbon dioxide atmosphere. After 24 h, 50 µl of the extract solution was added. After a further incubation of 72 h, cells were washed 3 times with phosphate buffered saline (PBS) solution. 100-µl neutral red solution (SERVA, 0.3 % in EAGLE-MEM) were added per well. The cells were then incubated for 3 h at 37° C, followed by another three times washing with PBS. 100 µl of a solution of acetic acid (1 %, v/v) and ethanol (50 %, v/v) in distilled water were added. After shaking for 15 min the optical density was measured at 540 nm with an ELISA-Reader-HT II (Anthos Labtec Instruments Salzburg, A). The

mean of four measurements for each concentration was determined (n=4). IC_{50} values (concentration that caused a 50% inhibition of growth compared with control) were calculated with help of micro cal. Origin program.

Results and Discussion

The results are shown in Table 1. Only four chloroform extracts exhibited moderate to marked toxicity against FL-cell lines. *Eureiandra balfourii* extract with highest activity of IC_{50} < 10 µg/ml is comparable with the activity of the reference compound Etoposid with IC_{50} of (9.1µg/ml). *Commiphora ornifolia* bark and *Limonium sokotranum* leaves showed a high to moderate inhibition of FL-cells with IC50 of 39.3 µg/ml and 136.3 µg/ml respectively. These results supported the previous reports regarding the cytotoxic activities of various species of the genus *Commiphora,* and the genus *Limonium* on different cell lines (Habtemariam, 2003; Zhu et al 2001; Kandil, et al 2000). The presence of triterpenes in the genus *Acridocarpus* may be involved in the cytotoxic activity (Shugeng Cao et al 2004). The results obtained in the course of this investigation are in agreement to a certain degree with the ethnomedical information. The traditional use of *Limonium as* antifungal agent may be due to the cytotoxic effect. It can also be mentioned that the lipophilic compounds ($CHCl_3$ – extracts) are more responsible for the cytotoxic activity in comparison to the hydrophilic ones.

Tab.1: cytotoxic activity of the extracts from 10 endemic Soqotraen plant species used in traditional medicine

Plant	Parts tested	Local name	Traditional uses	IC_{50} value (FL-cell line) in µg/ml
Asclepiadacea				
1. *Caralluma socotrana* (Balf.f.)N.E.Br. (SPAs 01)	Aerial parts	qamhiyn	dyspepsia	348.7[a], nd[b], 609.2[c]
Burseraceae				
2. Boswellia socotranao Balf.f (SPB-03)	Resin	Taliy'oh	Stomatitis	535.1[a], 507.1[b], 454.6[c]
3. *Commiphora ornifolia (*Balf.f.*)* Gillett (SP B 08)	Bark	Ikshih	Antiseptic	453.2[a], 495.9[b], **39.3[c]**
Cucurbitaceae				
4. *Eureiandra balfourii* Cogn (SP –Cu05)	Roots	di-ahsaweh	toxic	nd[a], nd[b], <**10[c]**
Euphorbiaceae				
5. *Cephalocroton socotranus* Balf.f (SPEu 05)	Leaves, flower	tan	Anti-infective	411.7[a], 544.4[b],430.7[c]
Malpighiaceae				
6. *Acridocarpus socotranus Olive*	Flowers	Kirilloh	Toxic to camels	nd[a], 464[b], 510[c]
7 *Acridocarpus socotranus Oliv*e (SPM01)	Leaves	Kirilloh		687.1[a], 662.3[b], **193.4[c]**
Moraceae	Flower ,leaves	Kartab	Skin diseases	500.2[a], 490.4[b], 387.8[c]
8. *Dorstenia gigas* Schweinf. exBalf. (SP Mo03)				
Plumbaginaceae				
9. *Limonium sokotranum* (Vierh) Radcl. Sm) (SP-Pl05)	Leaves	lizibih	antifungal	.615.1[a], 522.1[b], **136.3[c]**
Resedaceae				
10. *Ochradenus socotranus A.G. Mill* (SP-Re04)	Fruits	Gershiy'oh	Insecticide	nd[a], nd[b], 511.8[c]
Etoposide (SIGMA)				**18,3 µM)(9.1 µg)**

Most of the ethnomedical information has been taken from (Miller and, Morris, 2004) a : aqueous, b: methanolic, and c: chloroform extract

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