CYTOTOXICITY OF SCOPARIA DULCIS ON HUMAN CANCER CELL LINES

Monira Ahsan¹, Fatema-Tuz-Zohora¹*, Sheikh Nazrul Islam²

¹Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh.
²Institute of Nutrition and Food Science, University of Dhaka, Dhaka-1000 Bangladesh.

ABSTRACT
Scoparia dulcis L. (Scrophulariaceae) is a perennial herb. Plant parts are used as a cure for many ailments including diabetes. This work reports cytotoxicity of a pure compound glutinol and crude plant extracts on a panel of human cancer cell lines. Vinblastine was used as positive control. The MTT assay was employed to estimate the cell mortality. Cytotoxic ED₅₀ values of glutinol ranged from 140.91 to 215.44µM and the crude extracts showed 17.13 to 92.03% cell mortality at 500µg/ml on the tested cell lines. Percent cell mortalities by vinblastine were 90.00 to 94.10% 125µg/ml and cytotoxic ED₅₀ values of vinblastine were 5.25 to 6.12µM. Cell mortality for the negative controls (RPMI and RPMI–DMSO) were nil.

Keywords: Scoparia dulcis, Glutinol, Crude Extracts, Cytotoxicity, Human Cancer Cell Line.

INTRODUCTION
Scoparia dulcis L. (Scrophulariaceae) is an important medicinal plant. It is a perennial herb and is widely distributed in tropical and subtropical regions. Traditionally this plant is used in treatment of many ailments including diabetes, dysentery, earache, fever, gonorrhea, headaches, jaundice, snake bite, stomach problems, toothache, and warts [1]. A spectrum of medicinal properties such as analgesic [2], anti-inflammatory [3], antiviral [4], hypertensive [5], antihypertensive [6], diuretic [7], antidiabetic [8], even neuroprotective as anticholinergic [9-11] was reported for Scoparia dulcis. Its cytotoxicity was also documented [12-15]. This plant possesses many bioactive compounds [15-16] that contribute its medicinal properties and biological activities. This work described the cytotoxic activity of glutinol and crude extracts of Scoparia dulcis on a panel of human cancer cell lines.

MATERIALS AND METHODS
Plant Material
The aerial parts of Scoparia dulcis were collected in Dhaka. A voucher specimen (DACB 28069) has been deposited in the National Herbarium, Dhaka, Bangladesh.

Preparation of extracts and Isolation of glutinol
Dried aerial part of the plant (650g) of Scoparia dulcis was extracted successively in a Soxhlet with petroleum ether (60-80°), EtOAc and MeOH. The extracts were concentrated under vacuum to yield 15, 12 and 37g of crude residues respectively.

Glutinol (12mg) was obtained from Vacuum Liquid Chromatography fraction of petroleum ether extract, which was further fractionated in Sephadex LH-20 and was characterized by spectral analysis as reported elsewhere [15].

Cytotoxicity Assay
A panel of five human stomach cancer cell lines SCL, SCL-6, SCL-376, Kato-3, and NUCC-4 [17, 18, 19 ] were used to test the cytotoxicity of glutinol and crude extracts of Scoparia dulcis. The MTT assay as described by Mosmann [20] was employed to estimate the cell mortality. A series of serial dilutions of the crude extracts (500, 250, 125, 62.5, 31.25, and 15.63 µg/mL) and of the glutinol and vinblastine (250, 125, 62.5, 31.25, and 15.63 µg/mL) were tested on each of the cell lines. For...
RESULTS AND DISCUSSION

Table 1 describes cytotoxic activity of the glutinol and crude extracts of *Scoparia dulcis*. Cytotoxic ED$_{50}$ values of glutinol ranged from 140.91 to 215.44µM and the crude extracts showed 17.13 to 92.03% cell mortality at 500µg/ml on the tested cell lines. Percent cell mortalities by vinblastine were 90.00 to 94.10% at 125µg/ml and cytotoxic ED$_{50}$ values of vinblastine were 5.25 to 6.12µg/mL. Cell mortality for the negative control was nil. Anticancer or antitumour activity of *Scoparia dulcis* were also previously reported [12-15].

Among the crude extracts, petroleum ether extract presented the highest Kato-3 cell mortality (92.03±1.58%), which was followed NUGC-4 (90.40±3.93%) and SCL (83.83±8.87%). MeOH extract yielded moderate to mild cell mortalities ranging from 69.10±5.10% to 92.03±1.58% (SCL-37*6) to only 17.13±1.09% (Kato-3). Cytotoxic action of glutinol was shown very poor. Compared to vinblastine, its ED$_{50}$ values were found negligible.

A promising cytotoxic activity was indicated by ethyl acetate extract on most of the cancer cell lines and pet-ether extract on the Kato-3 and NUGC-4 cells.

CONFLICT OF INTEREST

Authors do not have any financial or commercial conflicts of interest to this work.

ACKNOWLEDGEMENT

Authors thank the Department of Immunology, University of Strathclyde, and Glasgow, UK for facilitating the MTT assay.

REFERENCES


