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Research Article

Anticancer activity of *Ixora coccinea linn* flower extracts against Human Breast Adenocarcinoma cells

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Abstract

The *Ixora coccinea Linn* flowers have been reported to have anticancer activity against various cancer cells due the presence of various bioactive peptides. In the present work anticancer activity of *Ixora coccinea Linn* flower extract against human breast adenocarcinoma cells was studied using MTT assay. The anticancer activity of different concentration of *Ixora coccinea Linn* flower extract was studied against human breast adenocarcinoma cells. The IC_{50} value of *Ixora coccinea Linn* flower extract was found to be 31.3 µg/ml. The anticancer activity of *Ixora coccinea Linn* flower extract was found to be efficient against human breast adenocarcinoma cells.

Keywords: Bioactive component; Phytochemicals; *Ixora coccinea Linn*; Human breast adenocarcinoma cells; Anticancer activity.

Introduction

Phytochemicals are biologically active chemical compounds naturally occurring in plants. Plants are rich sources phytochemcials in the form of secondary metabolites. Plants extract provides unlimited opportunities for new drug discoveries from phytochemcials. The adverse side effects and microbial resistance to the chemically synthesized drugs has turned the human to herbal drugs. Phytochemicals from plants are reported as safe and broadly effective alternatives with less adverse effect. Phytochemicals are reported for shown good anticancer, antimicrobial, antioxidant, antidiarrheal, analgesic and wound healing activity [1,2].

Ixora is a genus of the flowering plants containing around 500 species from the family *Rubiaceae*. *Ixora* plant and its various parts have been used as herbal drug by various ethnic groups of Africa, Asia and Europe. The active components present in this plant are used in the treatment of many human diseases such as leucorrhoea, dysentery, dysmenorrhoea, hypertension, menstrual irregularities, sprain, chronic ulcer, skin diseases and cancer [3-6].

Flower extract of *Ixora coccinea linn* contains ursolic acid, flavanoids, steroids, tannin and triterpenoids protective against systemic toxicity induced by cyclophosphamide and ciplatin [3,7]. Also used for treatment of amenorrhea, hypertension, whooping cough, ulcers, dysentery, haemoptysis and cancer. They also possess estrogenic and abortifacient properties [8]. It is also reported for pharmacological properties including antitumor, cytotoxic and anticancer, heptaprotective, chemo protective, antiinflammatory, antidiarrheal, antimicrobial and wound healing [9-11]. Thus the present work was focused on exploring the anticancer activity of *Ixora coccinea linn* flower extract against human breast adenocarcinoma (*MCF-7*) cells.

Materials and methods

Cell line and culture

MCF-7 cell line was obtained from Veterinary College, Vepery, Chennai. The cells were maintained in Minimal Essential Medium supplemented with 10% FBS, penicillin (100 U/ml), and streptomycin (100 µg/ml) in a humidified atmosphere of 50 µg/ml CO_2 at 37°C.

Reagents

MEM was purchased from Hi Media Laboratories Fetal Bovine Serum (FBS) was purchased from Cistron laboratories Trypsin, methylthiazolyldiphenyl-tetrazolium bromide

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(MTT) and Dimethyl sulfoxide (DMSO)were purchased from (Sisco research laboratory chemicals Mumbai). All of other chemicals and reagents were obtained from Sigma Aldrich Mumbai.

Extraction of phytochemicals form Ixora coccinea Linn flower

The petals from *Ixora coccinea Linn* flower (8 gm) was washed and ground with the 100 ml double distilled water to get the aqueous extract. The extract was centrifuged the separate the active phytochemicals into pellet, freeze dried and stored at 4°C for further use.

In-Vitro assay for anticancer activity of Ixora coccinea Linn flower by MTT assay

Cells (1×10^5/well) were plated in 24-well plates and incubated in 37^0C with 5% CO_2 condition. After the cell reaches the confluence, the various concentrations of the samples were added and incubated for 24 hrs . After incubation, the sample was removed from the well and washed with phosphate-buffered saline (pH 7.4) or MEM without serum. 100 µl/well (5 mg/ml) of 0.5% 3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-tetrazolium bromide (MTT) was added and incubated for 4 hours. After incubation, 1ml of DMSO was added in all the wells .The absorbance at 570 nm was measured with UV- Spectrophotometer using DMSO as the blank. Measurements were performed and the concentration required for a 50% inhibition (IC50) was determined graphically [12]. The % cell viability was calculated using eq. (1).

Cell viability (%) = (A570 of treated cells / A570 of control cells) × 100 ….(1)

Cell control and sample control is included in each assay to compare the full cell viability assessments.

Results and discussion

Cytotoxicity of the Ixora coccinea linn flower extracts against human breast adenocarcinoma cells

Anticancer activity of the *Ixora coccinea linn* flower extract was studied against human breast adenocarcinoma cells using MTT assay. The concentration of *Ixora coccinea linn* flower extract was varied from 7.8 to 1000 µg/ml (Fig. 1). The cells grown without *Ixora coccinea linn* flower extract was considered as control. The percentage viability of human breast adenocarcinoma cells were decreased with the increase in concentration of *Ixora coccinea linn* flower extract. The percentage toxicity to human breast adenocarcinoma cells were increased with the increase in concentration of *Ixora coccinea linn* flower extract. The highest cell toxicity of 82.7% was found for highest concentration (1000 µg/ml) and 32.7% cell toxicity was found for lowest concentration 7.8 (µg/ml) of *Ixora coccinea linn* flower extract. The cell toxicity of 76.93, 67.31, 61.54, 55.77, 48.08 and 38.47% was obtained for *Ixora coccinea linn* flower extract concentration of 500, 250, 125, 62.5, 31.2 and 15.6 µg/ml respectively. In-vitro assay of *Ixora coccinea linn* flower extract on human breast adenocarcinoma cells confirmed its effective anticancer activity.

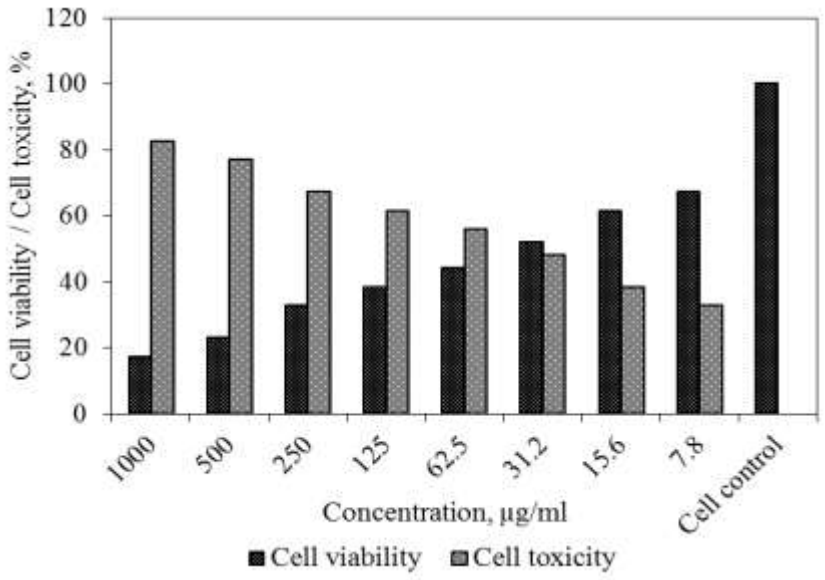

Fig. 1. Percentage cell viability and cell toxicity of varied concentration of *Ixora coccinea linn* flower extract on human breast adenocarcinoma cells

Microscopic analysis of human breast adenocarcinoma cells treated with different concentrations of Ixora coccinea linn flower extracts

The decrease in cell viability and morphology changes of human breast adenocarcinoma cells for different concentration were also confirmed from microscopic analysis for various concentration of *Ixora coccinea linn* flower extract. The morphology of normal human breast adenocarcinoma cells without *Ixora coccinea linn* flower extract is shown in Fig. 2. The cell toxicity and changes in morphology of human breast adenocarcinoma cells for 1000 µg/ml concentration of *Ixora coccinea linn* flower extract is shown in Fig. 3.

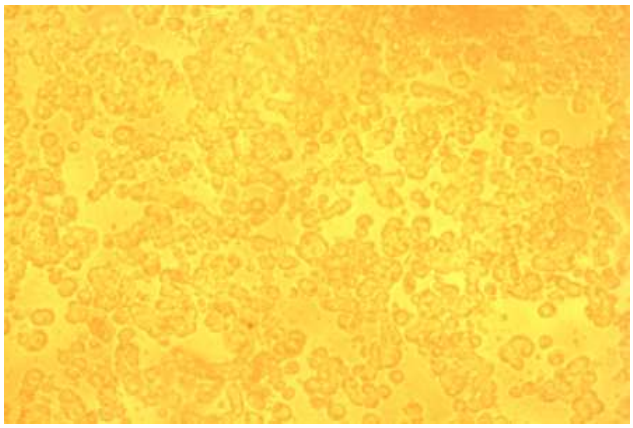

Fig. 2. Morphology of normal human breast adenocarcinoma cells without *Ixora coccinea linn* flower extract

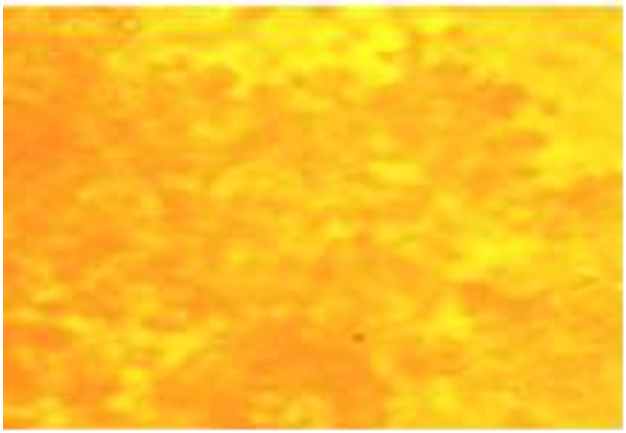

Fig. 3. Morphology of human breast adenocarcinoma cells for 1000 µg/ml concentration of *Ixora coccinea linn* flower extract

The cell toxicity and changes in morphology of human breast adenocarcinoma cells for 62.5 µg/ml concentration of *Ixora coccinea linn* flower extract is shown in Fig. 4. The cell toxicity and changes in morphology of human breast adenocarcinoma cells for 31.2 µg/ml concentration of *Ixora coccinea linn* flower extract is shown in Fig. 5. The cell toxicity and changes in morphology of human breast adenocarcinoma cells for 15.6 µg/ml concentration of *Ixora coccinea linn* flower extract is shown in Fig. 6.

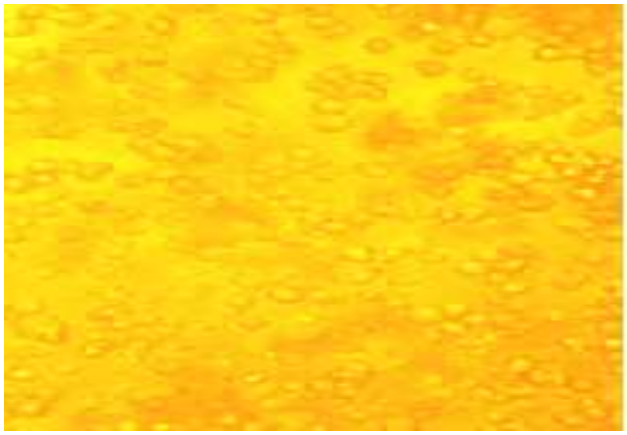

Fig. 4. Morphology of human breast adenocarcinoma cells for 62.5 µg/ml concentration of *Ixora coccinea linn* flower extract

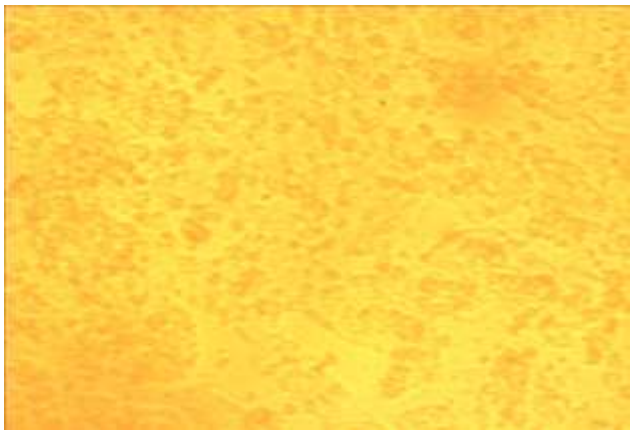

Fig. 5. Morphology of human breast adenocarcinoma cells for 31.2 µg/ml concentration of *Ixora coccinea linn* flower extract

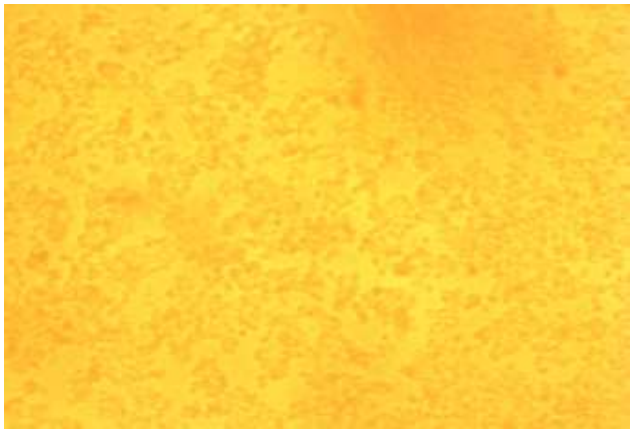

Fig. 6. Morphology of human breast adenocarcinoma cells for 15.6 µg/ml concentration of *Ixora coccinea linn* flower extract

Conclusions

The anticancer activity of flower extract of *Ixora coccinea Linn* was studied against human breast adenocarcinoma cells. The phytochemicals present in the flower extract has shown good anticancer activity against human breast adenocarcinoma cells. The decrease in cell viability of with increase in concentration of flower extract of *Ixora coccinea Linn* was observed. The IC_{50} value of *Ixora coccinea Linn* flower extract was found to be 31.3 µg/ml. Thus the *Ixora coccinea Linn* flower extract can be used as potential of anticancer agent againts against human breast adenocarcinoma cells.

Conflicts of Interest

Authors declare no conflict of interest.

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