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ANTICANCER ACTIVITY OF CUMINUM CYMINUM. L SEED EXTRACT AGAINST MDA MB – 231 BREAST CANCER CELL LINE

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ABSTRACT
Medicinal plants cumin or jeera (*Cuminum cyminum*) are exploring the healing nature formany diseases throughout the worldwide in the traditionally known for its medicinal properties such as antidiabetic, antitumor, anticancer, anti-inflammatory, antiviral. Apiaceae is one of the largest taxon among higher plants are the most cultivated members of the familyand grown throughout the worldwide. The extract of cumin seed (*Cuminum cyminum. L*) are utilised against MDA MB-231 Breast cancer cell line which are conducted with help of MTT Assay 3-(4,5-dimethlythiazol2-yl)-2,5- diphenyltetrazolium bromide. The experimental sample cumin of DMSO is carried out in different concentration(µg) from 10, 25, 50, 75 & 100 µg the prominent significance against the cancer cell line. Cytotoxicity (%) and viability(%) shows the reactivity rate form mild, moderate and serve condition.

KEYWORDS: Traditional Medicine, MTT assay, Anticancer Activity, MDA MB –231, *Cuminum cyminum. L*, Apiaceae.

INTRODUCTION
In recent year, the drug industries largely depend on natural compounds as a source of medicine. Herbal medicine products provide us relatively safe, effective, and economical therapeutic options, particularly in case of cancer where treatment is long term and cost is excruciatingly high. The statistics showed that over 60% of the recently used anticancer drugs are related to herbal origin.[2] Herbal medicines have been used traditionally to treat infections since 3000 BC. Healing potential of plants has been known for thousands of years. According to reports, it is estimated by world health organization that 80% of population of developing countries is dependent on the traditional medicinal plants as a source of drug.[8] Medicinal plants are prominent natural sources of phytochemical's, some of which have therapeutic values.[7] Many natural compounds such as terpenoids, phenolic acids, lignans, tannins, flavonoids, quinones, coumarins, and alkaloids were discovered from plant sources that contain significant antioxidant activities and play an important role in cancer treatment. Numerous cancer research studies have been conducted using traditional medicinal plants to discover new therapeutic agents that lack the toxic side effects associated with the present chemotherapeutic agents.[4]

Prospects of medicinal plants
Medicinal plants have proved their sole role in coping with several deadly diseases including cancer and the diseases associated with viral onslaught viz. Hepatitis, AIDS etc. There is a promising future of medicinal plants as there are about half million plants around the world, and most of them are not investigated yet for their medical activities and their hidden potential of medical activities could be decisive in the treatment of present and future studies.The medicinal effects of plants are due to secondary metabolite production of the plants.[11]

Cancer is one of the most dreadful diseases globally and it appears to be due to extreme freeradical damage, which eventually causes damage to the DNA, lipids, and protein.[9] An adoption of cancer-associated lifestyle choices including smoking, physical inactivity, and "westernized" diets.[10] The worldwide burden of cancer is increasing, as it is expected to rise to 22 million cases per year within the next two decades.[20] Patients diagnosed with cancer often experience a poor quality of life due to the adverse events associated with cancer.[19] Eight out of ten people dies due to coronary heart diseases and cancer. The second- largest common disease is cancer-malignant tumours. Incidences of cancer keep increasing on a global scale. The cancer-causing agents (carcinogens) can be present in food and water, in the air, and in chemicals and sunlight that people are exposed to. Since epithelial cells cover the skin, line the respiratory and alimentary tracts, and metabolize ingested carcinogens, it is not surprising that over 90% of cancers occur in epithelia.[22] Breast cancer

is one of the most common malignancies in women worldwide, with half of the cases seen in economically developing countries. Besides, 14% cancer deaths out of 23% of total breast cancer-cases in females were reported in 2008.[6]

Classification and nomenclature of cancer

In terms of behaviour, tumours are either 'benign' or 'malignant'. Benign tumours are generally slow-growing expansive masses that compress rather than invade surrounding tissue. Malignant tumours are usually rapidly growing, invading surrounding tissue and, most significantly, colonizing distant organs. Most, however, occur in solid tumours that originally appear in various tissues in various parts of the body. By their original locations they are classified into various types of cancer, such as lung, colon, breast, or prostate cancer.[6]

Apiaceae family is one of the most important families of flowering plants, which consists of 3780 species in 434 genera. It is distributed throughout the world, mostly in the northern temperate regions and high altitudes in the tropics. The main common features of Apiaceae species are aromatic herbaceous nature, alternate leaves with sheathing bases, hollow stems, small flowers, inflorescences determined in simple or compound umbel, and indehiscent fruits or seeds with oil ducts.

Species- Cuminum cyminum.

Common name: cumin.

Origin- Mediterranean region, antispasmodic, carminative, astringent, treatment of diarrhoea and digestive and respiratory disorders.

Essential oil (%) 2.5-4.5.

Main compound (%) cumin aldehyde other compounds - carotol, sabinene, β-terpineol, linalool, pinocarveol, γ-terpinene, myrtenal,copaene, α-pinene.

Apiaceae seeds are also a rich source of water-soluble glycoside of monoterpenoid, alkyl and aromatic compounds as well as cellulose, lignin, wax esters, pectin's, phospholipids, flavonoids, hydroxycoumarins, carotenoids, terpenoids and other types of compounds including sugars, lactones and quinones. Several previous studies on Apiaceae family plant materials reveal their importance as potential source of natural agrochemicals as well as their biological activities such as anti tumor, antimicrobial, anti-inflammatory, analgesic, radical scavenging, diuretic, gastrointestinal and anti-obesity properties. Therefore, in view of this immense medicinal importance, it is important to compile a comprehensive review covering the phytochemical constituents of seeds from Apiaceae family, their various pharmacological activities concentrating on antioxidant, antibacterial and antifungal activities, and their potential industrial applications.[21]

MATERIALS AND METHODS

Collection of Plant Sample

The dried seeds of *Cuminum cyminum* seed are collected from the locally available market.

Glasswares and Instruments

Test tubes, test tube stand, glass rod, spatula, centrifuge tubes, spectrophotometer, weighing machine, hemocytometer and centrifuge.

Cell Line Characteristics

Breast cancer cell line **MDA MB-231** - source of cell line was obtained from National Centre for cell science (NCCS) and carried out anticancer activity in SITRA (THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION), Coimbatore, India.

Preparation of Extract

DMSO (dimethyl sulfoxide) extract

The dried fine powder of *Cuminum cyminum* (Apiaceae) is subjected to dissolved with dimethyl sulfoxide (DMSO) at initial stage of the anticancer activity (Breast cancer cell lineMDA MB-231).

Anticancer Activity

Mtt ASSAY

MTT assay measure the reduction of yellow 3-(4,5-dimethlythiazol2-yl)-2,5- diphenyltetrazolium bromide (MTT) by mitochondrial succinate dehydrogenase. MTT entersthe cells and passes into the mitochondria where it is reduced to an insoluble, coloured (dark purple) formazan product. An in vitro cytotoxicity test method is performed for dried fine powder *Cuminum cyminum* (Apiaceae) with DMSO extract. The breast cancer cell line MDAMB-231 were grown in culture media – MEM medium supplemented with 10% FBS (fetal bovine serum). The cells were trysinized and counted on cell hemocytometer.

Approximately 10,000 cells per well were seeded in a 96 – well plate and incubate for 24 hours. The culture medium from the MDA MB – 231 cells were replaced with fresh medium.Test sample at different concentration were added in triplicates on the cells. After incubation at 37±1ºc for 18 hours, MTT(1mg/ml) were added in all the wells and incubated for 4 hrs. after incubation, DMSO were added in the wells and read at 570 nm using photometer.

Cytotoxicity and cell were calculated by below formula. Cytotoxicity = [(Control – Treated)/ Control] × 100 Cell viability = (Treated / Control)

RESULT

Mtt Assay

The test sample Cuminum cyminum showed mild to serve cytotoxic reactivity to MDAMB-231 cells after 24 hours contact.

Morphological changes

In present study, MDA MB-231 cells exposed with 5µg/ml concentration for above 24 hours contact were observed to be 45% cytotoxicity and cell viability rate 55% shows mild reactivity. 25µg/ml and 50µg/ml concentration above 24 hours contact were observed to be52%,55% cytotoxicity and cell viability rate 48%,45% shows moderate reactivity. 75µg/ml and 100µg/ml concentration for above 24 hours contacts were observed to be 74%, 73% cytotoxicity and cell viability rate was 26%, 24% shows serve reactivity. The result is showed in the table No.1, figure No.1 and plate No.1

Table No.1: Anticancer Activity (Mda Mb-231)

SAMPLE	Concentration (µg)	Cytotoxicity (%)	Viability (%)	Reactivity
DMSO Extract of *Cuminum cyminum* seed	10	45	55	Mild
	25	52	48	Moderate
	50	55	45	Moderate
	75	74	26	Severe
	100	73	24	Serve

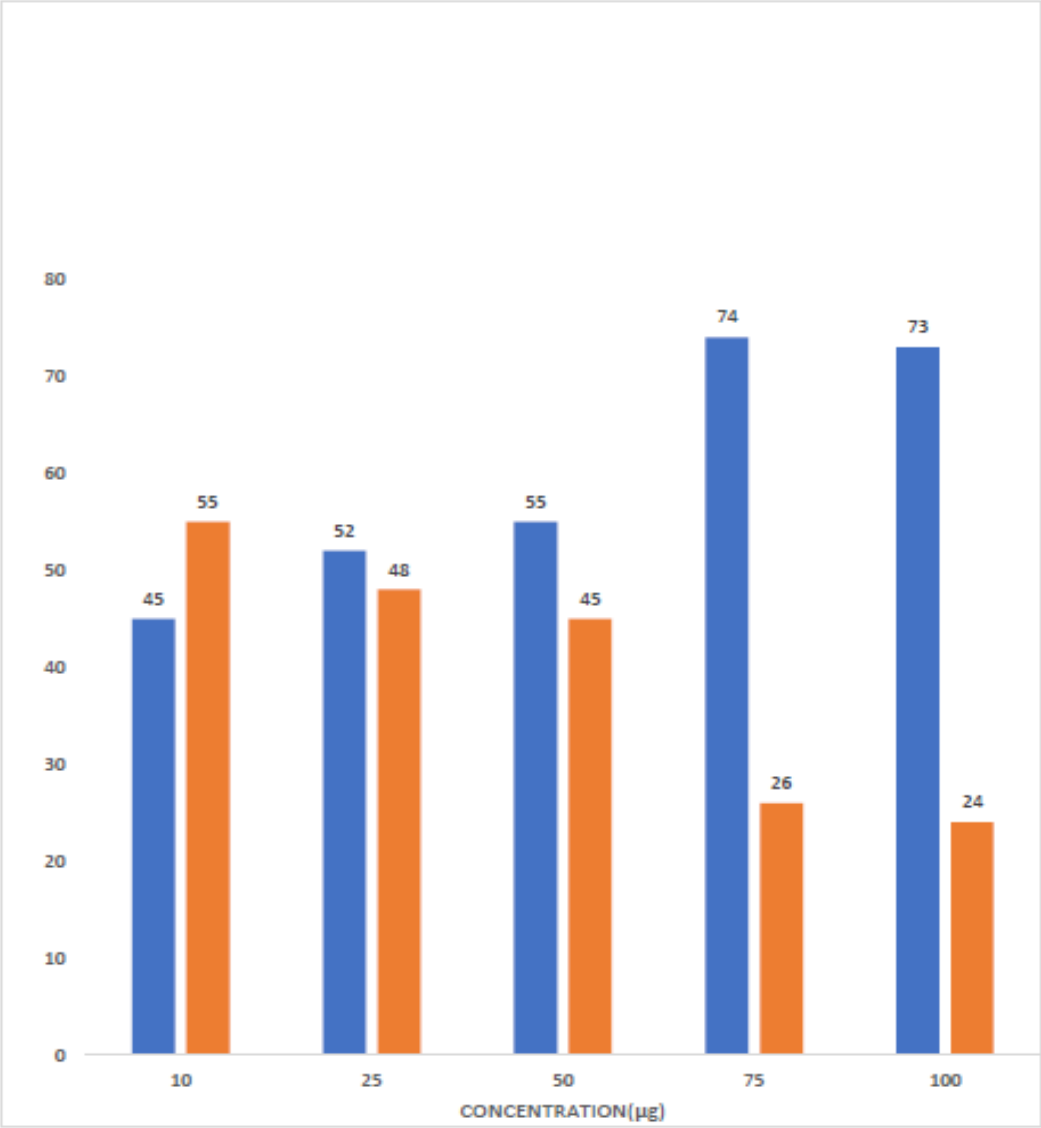
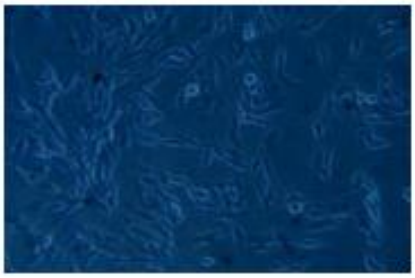


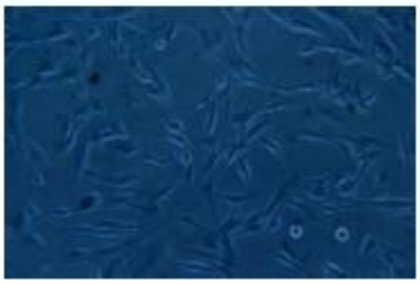
Figure No.1.

Plate No:1
Anticancer Activity (Mda Mb -231)

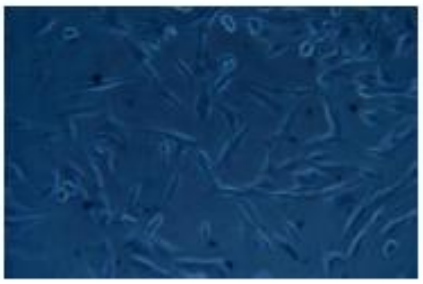
Control



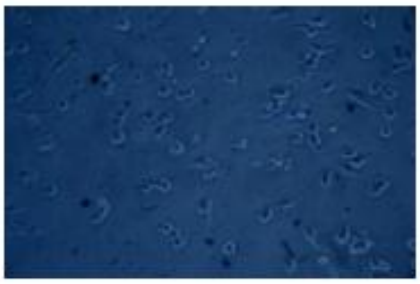
10 µg



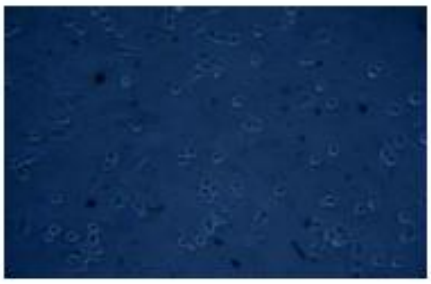
25 µg



50 µg



75µg



100 µg

DISCUSSION

Psa And Pso Significantly Reduced Cell Viability, And Altered The Cellular Morphology Of Mcf-7 Cells In A Concentration Dependent Manner. Concentrations Of 50 Mg/Ml And Above OfPsa And 100 Mg/Ml And Above Of Pso Were Found To Be Cytotoxic In Mcf-7 Cells. Cell Viability At 50, 100, 250, 500 And 1000 Mg/Ml Of Psa Was Recorded As 81%, 57%, 33%, 8%And 5%, Respectively, Whereas At 100, 250, 500, And 1000 Mg/Ml Of Pso Values Were 90%, 78%, 62%, And 8%, Respectively By Mtt Assay. Mcf-7 Cells Exposed To 250, 500 And 1000 Mg/Ml Of Psa And Pso Lost Their Typical Morphology And Appeared Smaller In Size. The Data Revealed That The Treatment with PSA and PSO of *Petroselinum sativum* induced cell death in MCF-7 cells (Farshori *et al*., 2013).

The present study demonstrated that the antioxidant and anticancer profile of *Coriandrum Sativum* was effective against HT-29 cells. MTT assay showed that the incubation of cancer cells lines with *Coriandrum Sativum*, reduced the viability of cancer cells and the dead cells were significantly increased with extract concentration. Thus, the ethanolic extract of *Coriandrum Sativum* exhibited high cytotoxicity of 93.8% (Nithya TG& Sumalatha D, 2014).

Cisplatin was more cytotoxic than carboplatin at each concentration and each exposure period. Similar results were obtained for the other five cell lines. However, there was a significant difference in cytotoxicity between a 1-hr and a 24-hr chemotherapeutic exposure period for cisplatin (median at 1 hr, 301 µg/ml; 24 hr, 34 µg/ml, P =

0.003) and carboplatin (median at 1 hr, ~500 µg/ml; 24 hr, 319 µg/ml, P = 0.006) (Fanning J *et al.*,1990).

Different concentration i.e., 8,15.6,31.25,62.5,125,250,500 and 1000 µg of the plant extract of *Eugenia jambolana* were tested for the anticancer activity effects against human tumor cell line (Hep 2 cell line), the fifty percentage of cell death occurred when using 125 µg of plant extract and highest cell death occurred at 1000 µg (Ogato DM *et al*., 2015).

The aqueous and methanolic extracts (100 µg/ml) were obtained from the plant samples and are used for anticancer studies using HL-60 cell lines. A maximum viability of 85.4% was observed with methanolic seed extract, while a minimum of 44.6 % with aqueous leaf extract of Samadera indica. However, there is a good viability percentage with aqueous and methanolic extracts of plant parts used in the present investigation. So, cytotoxicity was to lesser extent with methanolic and aqueous extracts of all the three plant species. (Rama Bhat P, 2017).

In this study, we demonstrate the anticancer potential of the aqueous extract of fruits of *Momordica dioica* in well characterized PA-I and Hela cell lines. Among the different concentrations of the aqueous extract of fruits of *Momordica dioica*, 50% cell viability was determined at the concentration of 40 µg/ml in Hela cell lines. Cisplatin served as a positive control which showed 50% cell viability at the concentration of 2.5 µg/ml on both the cancer cell line. Morphological changes in PA-I and Hela cancer cells treated with aqueous extract of fruits of *Momordica dioica*, indicating apoptosis occurring in the concentration dependentmanner (Ahirrao RA, 2019).

CONCLUSION

Cytotoxicity studies revealed that the extract of cumin seeds (CUMINUM CYMINUM L.,) Shows the maximum level of cytotoxicity reactivity 76% rate and reduced part 26% cell viability against the breast cancer compared with past researchpaper work.

It plays a beneficially part in the traditional and herbal medicine which is more effective and safer side compared to the modern allopathic medicines. By including cumin seeds as in form of ingredients, condiment in daily dietary supplements can be more active method to cure and prevent the breast cancer disease at early stage of development.

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