

Original Research Article

Effect of Organically Grown *Curcuma longa* (Turmeric) on Leukemic and MCF-7 Cell Lines

Priyanka Argade and Shubhangi Puranik*

Department of Biotechnology, Modern College of Arts, Science & Commerce,
Shivajinagar, Pune-5, India

*Corresponding author

ABSTRACT

The use of organic medicinal plants for the control and management of diseases is a cheaper in price, having zero side effects and readily available substitute for the expensive synthetic drugs. The study aimed at making a scientific intervention, to validate with selected medicinal plant used for the treatment of livestock (milking animals) cancer. Anti-cancerous activity of *curcuma longa* was done in-vitro. Organic Turmeric is used to cure different types of cancers in humans and animals. Our main objectives are to produce a effective herbal drug against cancer, to improve the commercial value of organic medicinal plants and to improve the resistance against cancer in milk producing animals (breast cancer). MTT assay (2-5 dimethyl tetrazolium) for assessing cell viability, is used for leukemic cell line. SRB assay (sulforhodamine B) for cell density determination is used for MCF7 cell line. From this study it is observed that, extracts of organic turmeric may be a good alternative for commercially available chemical drugs used in cancer treatment.

Keywords

Organic
Turmeric,
MTT assay,
SRB assay

Introduction

Plants are an indispensable source of both preventive and curative medicinal preparations for humans and their domestic animals. The use of medicinal plants for the control and management of diseases is a cheaper and readily available complement for the expensive synthetic drugs that are often in short supplies.

The study aimed at making a scientific intervention, to validate some selected medicinal plants used for the treatment of

livestock cancer, with a bias on bacterial related infections. Organic turmeric is used to cure different types of human and animal cancers. Turmeric (*Curcuma longa*) is a rhizomatous herbaceous perennial plant of the ginger family, Zingiberaceae. Its active ingredient is curcumin. Curcumin has been a centre of attraction for potential treatment of an array of diseases, including cancer, Alzheimer's disease, diabetes, allergies, arthritis and other chronic illnesses. Curcumin is believed to have a wide range

of biological effects including anti-inflammatory, antioxidant, antitumour, antibacterial, and antiviral activities, which indicate potential in clinical medicine. In Chinese medicine, it is used for treatment of various infections and as an antiseptic.

Material and Methods

MTT assay (2-5 dimethyl tetrazolium) for assessing cell viability, is used for leukemic cell line. SRB assay (sulforhodamine B) for cell density determination is used for MCF7 cell line.

Extract samples of different concentrations were prepared by ethanol extraction method. All samples were prepared aseptically and kept at -20°C. until use. THP-1(Leukemic) cell line was grown in RPMI-1640 medium supplemented with 20% v/v heat inactivated FCS and maintained in a humidified atmosphere of 5% CO₂ at 37°C. Media is added to make cell concentration to be 1x10⁴ cells per ml and 100 µl of this concentration is added to each well of micro well plate and seeded for 24 h for cell stabilization. Add 100ul of extract and standard drug in triplicate for cytotoxicity test by MTT assay. The optical density was measured at 490nm. The graphs of the drug concentration & % growth inhibition were plotted. The IC₅₀ can be calculated as per the graph.

% growth inhibition = Mean OD of wells receiving each drug dilution / Mean OD of the control wells *100

The in vitro determination of toxic effects of unknown compounds has been performed by counting viable cells after staining with a vital dye. The sulphorhodamine B (SRB) assay system is a means of measuring total biomass by staining cellular proteins with the sulphorhodamine B. The key component is the dye, sulphorhodamine B. The cells are

briefly washed, fixed and stained with the dye. The incorporated dye is then liberated from the cells in a tris base solution. An increase or decrease in the number of cells (total biomass) results in a concomitant change in the amount of dye incorporated by the cells in the culture. This indicates the degree of cytotoxicity caused by the test material.

Results and Discussion

It has been found that plant-derived compounds have been an important source of several clinically useful anti-cancer agents. These include vinblastine, vincristine, the camptothecin derivatives, topotecan and irinotecan, etoposide, derived from epipodophyllotoxin, and paclitaxel (taxol). A number of promising new agents are in clinical development based on selective activity against cancer-related molecular targets, including flavopiridol and combretastin A4 phosphate, while some agents which failed in earlier clinical studies are stimulating renewed interest. Plants have a long history of use in the treatment of cancer. In his review, Hartwell lists more than 3000 plant species that have reportedly been used in the treatment of cancer. Curcumin due to its various medicinal, biological, pharmacological activities is high on demand and has high market potential, high cost. Various methods of extraction of curcumin are studied (Anamika Bagchi, 2012).

Considerable work have been done on medicinal plants to treat cancer, and some plant products have been marketed as anticancer drugs, based on the traditional uses and scientific reports. These plants may promote host resistance against infection by re-stabilizing body equilibrium and conditioning the body tissues.

Table.1 Effect of Turmeric extract

Concentration	% Growth Inhibition
200	86.64
20	78.16
2	63.62
0.2	0
0.002	0

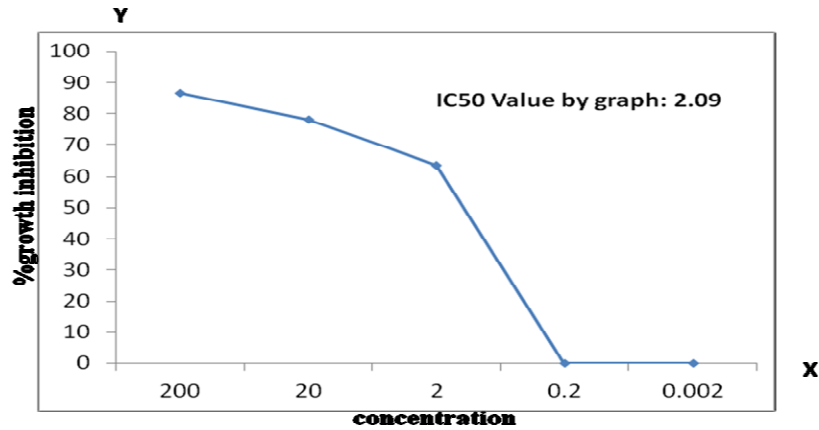
Table.2 Effect of Standard Drug

Concentration	% Growth Inhibition
200	97.33
20	96.68
2	88.24
0.2	57.39
0.002	0

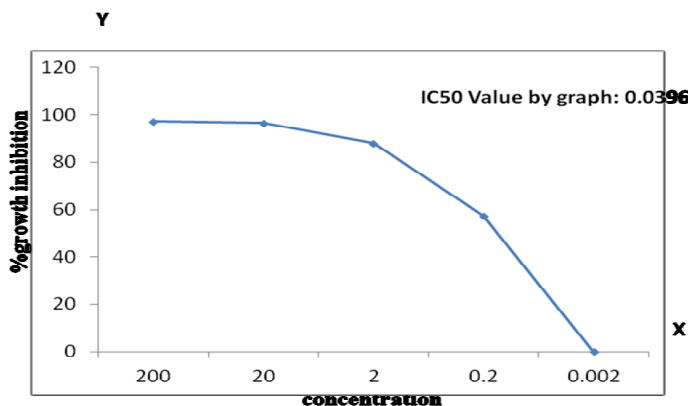
Table.3 Results of SRB Assay

Concentration	% Growth Inhibition
10	72
1	60
0.1	28.32
0.01	0
0.001	0

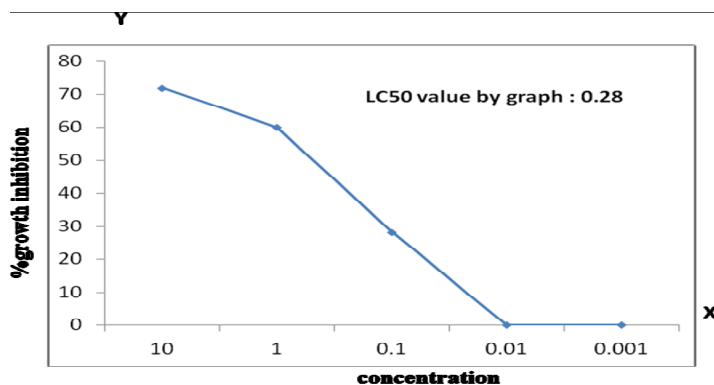
Results:



Graph:1 Effect of Turmeric extract on Leukemic cells by MTT assay



Graph:4 Effect of standard drug on Leukemic cells by MTT assay



Graph:1 Effect of turmeric extract on MCF7 cells by SRB assay

Several reports describe that the anticancer activity of medicinal plants is due to the presence of antioxidants in them. The rate with which cancer is progressing, it seems to have an urgent and effective effort for making good health of humans as well as animals.

Breast cancer is a kind of cancer that develops from breast cells. Breast cancer usually starts from inner lining of milk duct, or the lobules that supply them with milk. A breast cancer that started off in the lobules is known as lobular carcinoma. Causes of breast cancer are getting older, genetic, alcohol consumption, obesity, height, certain jobs, cosmetic, etc.

Leukemia is the cancer of blood and bone marrow. A person who has leukemia suffers from an abnormal production of blood cells, generally leukocytes.

The study was conducted to document in-vitro pharmacological activities of selected medicinal plant species used for treating leukemia (blood and bone marrow) and breast cancer in human and cattle. The objectives of the study to produce a effective herbal drugs against cancer, to improve the commercial value of organic medicinal plants, to improve the value of herbal plants in daily life of humans & to improve the resistance against cancer in milk producing animals (breast cancer).

Turmeric (*Curcuma longa*) is selected for study. From the leukemic (THP-1) and mcf7 cell lines were collected and anticancer activity was checked. The above mentioned medicinal plant showed anticancer activity against leukemic and mcf7. MTT (2-5 dimethyl tetrazolium) assay and SRB (sulphorhodamine - B) assay were used for to check the cytotoxicity of cells by using micro plate reader and with the help of IC50 value. The in-vitro studies of powder extracts of the selected medicinal plants species on leukemic and mcf7 cell lines were conducted as a preliminary proof to support their use in traditional management of cancer disease.

From this study it is observed that, the above herbal extract may substitute for the drugs used in cancer treatment as well as to minimize the side effects of the drugs. Considering the cost of the treatment for different diseases, use of herbal extract is economic and affordable to common man.

As studied from earlier researches, it is seen that there are many chemical drugs used for treatment of cancer but nevertheless has lot of side effects. To eliminate these side effects, it is very much important to use natural drugs rather organic drugs for treatment of cancer. In this study we have used extracts of three organically grown plants against cancerous cells. From the above study it was concluded that turmeric plant samples showed very good anticancerous effect. Further if we compare the results. Use of turmeric (*curcuma longa*) is also a good option for management of cancer diseases in animals.

Acknowledgement

We are grateful to Dr. R. S. Zunjarrao, Principal, Modern College of Arts, Science and Commerce, Pune-5, for giving an

opportunity to carry out the project in college and providing all the facilities required. We are also grateful to Prof. S.S. Deshmukh, Coordinator, Modern College of Agriculture Biotechnology, Paud, Pune, for being a consistent motivator.

References

- Anamika Bagchi, 2012. Extraction of Curcumin. *J. Environ. Sci. Toxicol. Food Technol.*, 1(3).
- Gafar, M.K., Itodo, A.U., Warra, A.A., Abdullahi, L. 2012. Extraction and physicochemical determination of ginger. *Int. J. Food Nutr. Sci.*, 1(2).