



ANTICANCER ACTIVITY OF *ACALYPHA WILKESIANA* ROOTS ON HUMAN CANCER CELL LINE

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ABSTRACT

The present study has been made to study the anticancer activity for the medicinal plant *Acalypha Wilkesiana* using pet ether, chloroform, ethyl acetate, ethanol and water extract. Cytotoxicity assay was carried out using MCF-7 cell line by MTT assay protocol. The breast cancer cell was exposed to different concentration 10,1,0.1,0.01, and 0.001. The IC₅₀ value of various solvents extract of anticancer activity was determined.

Keywords: *Acalypha wilkesiana*, Anticancer activity, MCF-7 cell line

INTRODUCTION:

Cancer is a group of diseases caused by loss of cell cycle control. Cancer is associated with abnormal uncontrolled cell growth. Cancer is caused by both external factors (tobacco, chemicals, radiation and infectious organisms) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism) [1]. Cancer is considered the second cause of death in humans. In 2020, the WHO predicted 25 million new cases

and almost 10 million cancer deaths worldwide. The main cause of death is breast cancer (2.26 million cases), lungs (2.21 million cases); colon and rectum (1.93 million cases); prostate (1.41 million cases); skin (non-melanoma) (1.20 million cases); and tumor (1.09 million cases) [2]. Several reports describe that the anticancer activity of medicinal plants is due to the presence of antioxidants present in them. In fact, the medicinal plants are easily available,

cheaper and possess no toxicity as compared to the modern (allopathic) drugs [3]. Current treatments include chemotherapy, radiotherapy and chemically derived drugs. Current Treatments such as chemotherapy can put patients under a lot of strain and further damage their health. Therefore, there is a focus on using alternative treatments and therapies against cancer. Many plant species are already being used to treat or prevent development of cancer. Multiple researchers have identified species of plants that have demonstrated anticancer properties with a lot of focus on those that have been used in herbal medicine in developing countries [4]. A lot of recent investigations have been carried out for advancements in the treatment and control of cancer progression, significant work and room for improvement remain. The main disadvantages of synthetic drugs are the associated side effects. However natural therapies, such as the use of the plants or plant derived natural products are being beneficial to combat cancer. The search for anti-cancer agents from plant sources started in the 1950s when discovery and development of the vinca alkaloids (vinblastin and vincristine), and the isolation of the cytotoxic podophyllotoxins was carried out [5]. Medicinal plants are considered as a repository of various bioactive compounds and they show wide range of biological

activity which includes anti-tumor, anti-viral, anti-inflammatory and anti-malarial activity. Knowledge of the medicinal plants for the preparation of various drugs has been of great significance. Medicinal plants are considered as a rich source of wide variety of ingredients which can be used for the development of drug. Anticancer properties of several medicinal plants are used to find a lead compound that can block the development of cancer [6]. Ayurvedic classic works of literature have evidence of the variety of herbs for the purpose of cancer. 80% of the medicine used before the 20th century was obtained from the medicinal plants' leaves, barks and roots. During that time crude botanicals were extracted in fluid like water, milk, and alcohol and the extract was prescribed to the patients. More than 25% of the drugs used are directly derived from plants and the other 25% are natural product models. Natural products like vinblastine, vincristine, taxol, docetaxel and camptothecins are being used in chemotherapy [7]. In traditional medicine of the most countries have known many natural substances for a variety of cancers. Some of the most commonly known traditional anticancer materials. *Acalypha wilkesiana* is a plant readily available in Landmark University, Nigeria, West Africa. It has proven medicinal properties. This plant is

often called "copperleaf or Jacob's coat thrives in partial shade or sun. The leaves, which may be flat or crinkled, are large and broad with teeth around the edge. It has the following dimensions: height is about 2–3m, length 10–20 cm and 15 cm wide. It is a widely cultivated ornamental, outdoor plant due to its attractive red colouration. It is valued for its wide range of variegated cultivars and hedge. In spite of the advancement in medical science, millions of people still resort to the use of naturally occurring, low cost and environmentally benign medicinal plant such as *Acalypha wilkesiana*. Both the leaves and seeds of *A. wilkesiana* are medicinally potent. In the developing world, it has been used for healing of different ailments. Researchers have reported its effectiveness in treatment of malaria, skin diseases, gastro-intestinal disorders, hypertension and diabetes mellitus, breast tumor in Western Nigeria [8]. *A. wilkesiana* is a medicinal plant which has widely been utilized for treating bacterial and fungal infections. In some cases, the plant is also used to treat malaria, gastrointestinal problems, and potentially cancers [9]. *Acalypha wilkesiana* leaves have cytotoxic activity against MCF-7 breast cancer cells using an acid phosphatase test; and against human brain & lung cancer cells, in addition, it also induces the process of apoptosis [10]. A survey of literature

revealed of roots extracts of *Acalypha wilkesiana* was not done so far, an attempt is made in the present study to anticancer activity. The present work reports the anticancer activity of the extracts of *Acalypha wilkesiana*. There is no previously published research on the anticancer activities of the roots parts from this plant.

MATERIAL AND METHODS:

Plant used for the study is *Acalypha wilkesiana*, collected from the toranmal hill station, Nandurbar district, Maharashtra, India. The plant materials were authenticated by authorized person from i) Botany Department of PSGVPM' Arts, Science, Commerce College, Shahada ii) Botanical survey of India, Pune.

Preparation of plant extracts: The collected roots of both plants are taken for primary processing i.e. washing to get rid of sand or soil material adhered to the roots. The washing was done by using tap water twice. The cleaned Big or long roots are cut into small pieces size 2c.m. to 5c.m. (size reduction) The reduced size material of both plants was taken for shade drying technique. The dried roots of both plants are separately taken from pulverization by using grinding to get coarse powder. The dried part of plant material/s of *Acalypha wilkesiana* were subjected for Hot Continuous successive Extraction (Soxhlet) by using different solvents according to increasing polarity.

(Petroleum ether, Chloroform, Water, Ethyl acetate, Ethanol).

Anticancer activity: MTT [(3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide)] is a pale yellow substrate that is cleaved by living cells to yield a dark blue formazan product. This process requires active mitochondria, and even freshly dead cells do not cleave significant amount of MTT. Thus the amount of MTT cleaved is directly proportional to the number of viable cells present, which is quantified by colorimetric methods. This assay was performed at Deshpande Laboratories, Bhopal using the standard operating procedures. Briefly the compounds were dissolved in DMSO and serially diluted with complete medium to get the concentrations a range of test concentration. DMSO concentration was kept < 0.1% in all the samples MCF-7 cells maintained in appropriate conditions were seeded in 96 well plates and treated with different concentrations of the test samples

and incubated at 37 °C, 5% CO₂ for 72 hours. MTT reagent was added to the wells and incubated for 4 hours; the dark blue formazan product formed by the cells was dissolved in DMSO under a safety cabinet and read at 550nm. Percentage inhibitions were calculated and plotted with the concentrations used to calculate the IC₅₀ values.

RESULTS AND DISCUSSION:

In this assessment, we have the tendency to utilize the MTT test to assess the cytotoxic impact of the pet ether, chloroform, ethyl acetate, ethanol and water roots extract of *A.wilkesiana* against on MCF-7 Human breast cancer cell line. MTT assay was carried out to observe the despotic effects of various extracts of *A.wilkesiana* on the growth of MCF-7 Human breast cancer cell line and the results are represented in **Table 1**; Five completely diverse concentrations (10,1,0.1,,0.01,0.001 µg/mL) of pet ether, chloroform, ethyl acetate, ethanol and water roots extract of *A.wilkesiana* were applied.

Table 1: Effect various roots extract of *A.wilkesiana* on Breast cancer cell line (MCF-7)

Concentration	AW PET ETHER	AW CHLOROFORM	AW ETHYL ACETATE	AW ETHANOL	AW WATER
10	46.25	48.62	51.26	56.62	52.27
1	34.15	26.54	31.17	41.28	26.64
0.1	18.62	18.91	15.62	36.67	16.95
0.01	6.54	13.62	12.57	18.84	8.24
0.001	3.67	5.51	5.38	12.63	5.49
IC50 value µg/ml	>10	>10	10	3	7

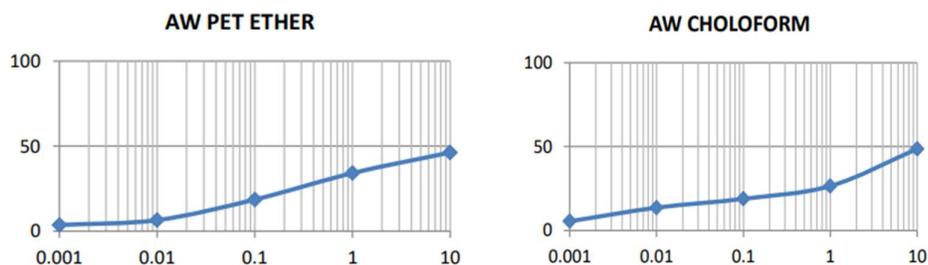


Figure 1: Show IC₅₀ value of extract of Pet. Ether and Chloroform concentration of *A. wilkesiana*

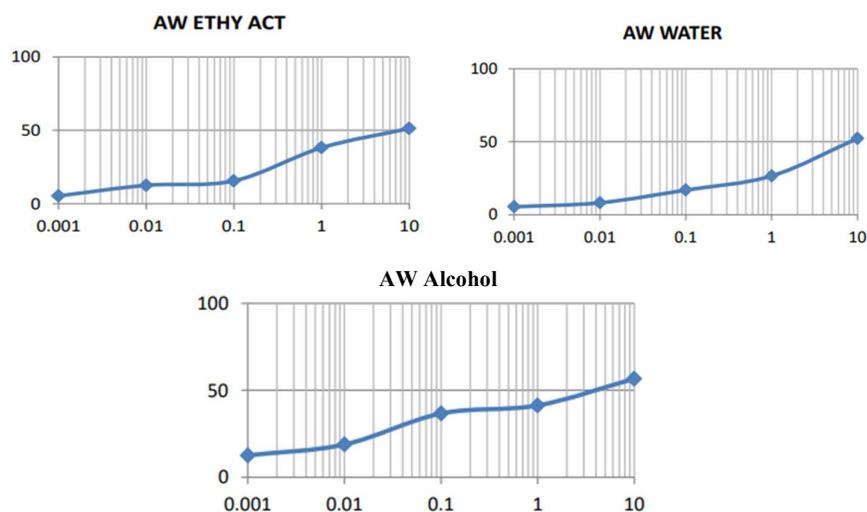


Figure 2: Show IC₅₀ value of extract of Ethyl acetate, Water, and Alcohol and concentration of *A. wilkesiana*

The in vitro cytotoxicity against breast cancer cell lines showed potential cytotoxic activity. The results obtained are showed in **Table 1**. The results clearly indicates the concentration dependent inhibition of MCF-7 cells, with an IC₅₀ value.

CONCLUSION: In conclusion, various extract of *Acalypha wilkesiana* roots has cytotoxic activity against MCF-7 breast cancer cells. This study has suggested roots of *Acalypha wilkesiana* as good anticancer agents, Therefore it is suggested that the isolation of active constituent to obtain a good therapeutic agent

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