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ANTI-PROLIFERATIVE EFFECT OF CISSUS QUADRANGULARIS STEM EXTRACT ON HUMAN BREAST CANCER CELLS

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ABSTRACT:

AIM: The purpose of this research was to investigate whether an aqueous extract of CissusQuadrangularis might inhibit the cell proliferation on MCF-7 human breast cancer cells.

METHODS: The anti-proliferative properties of CissusQuadrangularis were evaluated using the MTT assay on a human breast cancer cell line. In addition, phase contrast microscopy was used to study the herbal extract-induced morphological changes. All collected data were statistically examined and calculated (SPSS/10 Software Package; SPSS Inc., Chicago, IL, USA) using one-way ANOVA.

RESULTS: The cytotoxic potential of the aqueous extract of CissusQuadrangularis against the MCF-7 cell line was substantiated by a higher level of anti-proliferative activity after 24 hours of treatment. The MTT test clearly demonstrated that C.quadrangularis treatment drastically decreased cell viability in different dose and time for 24 hours respectively. The P value is <0.001

CONCLUSION: The current study demonstrates that an aqueous extract of C. quadrangularis has a cytotoxic impact on the MCF-7 human breast cancer cell line at a concentration of 18 g/mL, which represents the IC50 value.

Key words: *C.quadrangularis,* Anti-Proliferation, Breast Cancer, Apoptosis

INTRODUCTION:

Cancer is the uncontrolled growth of ailments associated with abnormal cell development that has the ability to spread to other parts of the body. These distinctions with benign tumours, that do not really unfold. Possible signs and symptoms include the presence of a lump, atypical injury, protracted cough, unexplained weight loss, and changes in the regularity of bowel motions. Although these symptoms could point to cancer, there are other possible explanations for why they are occurring. There are more than a hundred different types of cancer that may affect people. (1)Breast cancer is the second most common malignancy among women in the United States. There are many subtypes of carcinoma that may manifest as breast cancer (2).

Breast cancer may arise in a variety of breast tissues. The breast consists of three major components: lobules, ducts, and animal tissue. The lobules are the milk-producing glands. The ducts consist of tubes that transport milk to the teat. (3) The animal tissue (comprised of fibrous and fatty tissue) encompasses and supports everything. The majority of breast cancers start in the ducts or lobules. (3) Breast cancer may spread beyond the breast through blood arteries and fluid-carrying vessels. Once carcinoma has spread to other parts of the body, it is said to have metastasized. Invasive ductal malignant neoplastic disease and Invasive lobe malignant neoplastic disease are the most prevalent kinds of cancer.

Cissusquadrangularis, also known as grassland grape, adamant creeper, and devil's backbone, is a member of the family of grapes. Cissusquadrangularis, which is indigenous to certain regions of Asia, Africa, and Arabia, has been used as a natural medicine for a multitude of diseases for a very long time. It is one of the most often used medicinal herbs in Asian countries, as well as in ancient African and Ayurvedic medicine. All parts of the plant are utilised for medicinal purposes. Common uses for Cissusquadrangularis include bone health and weight reduction. It is also used for polygenic illness, excessive cholesterol, haemorrhoids, and several other ailments, however there is no scientific evidence to support these applications. There's not enough data to understand however Cissusquadrangularis may work for medicative functions in folks. In vivo and in vitro studies demonstrate its inhibitory, analgesic, and anti-inflammatory effects. It would be active against the organism responsible for protozoal illness. (5)

C. quadrangularis may grow to a height of 1.5 metres (4.9 ft) and has branches that are sectioned in a quadrangular pattern. The internodes on these branches are between 8 and 10 centimetres (three to four inches) long and 1.2 and 1.5 centimetres (0.5 and 0.6 inches) broad. There may be leathered edges on all sides. The nodes of toothed trilobe leaves are 2–5 cm (0.8–2.0 in) broad. Every node has a plant structure that grows from the other side. Racemes of yellowish or multicoloured cabbage butterfly blooms; spherical berries become red when mature. Cissusquadrangularis is an evergreen climber that grows quickly to five metres (16 feet) by.5 metres (1.6 feet). It is hardy to zone ten (UK). suitable for light (sandy), medium (loamy), and heavy (clay) soils. It likes soil that drains well and can grow in soil that doesn't have much nutrition. Acid, neutral, and basic (alkaline) soils are all suitable, but it may even thrive in very acidic and alkaline soils. It is unable to thrive in the shade. It enjoys moist or dry soil and can withstand drought. (6) The goal of this research is to see whether C.quadrangularis leaf extract has antiproliferative properties in human breast cancer cell lines.

MATERIALS AND METHODS:

CELL VIABILITY ASSAY

The cytotoxic activity of C. quadrangularis stem extract was evaluated using the MTT test, which was performed in accordance with Mosmann's methodology (7). In a brief, the cells were planted in a 96 well microtiter plate with replications at a concentration of 1 x 105 cells per millilitre. Each well contained 100 microliters of medium. Different concentrations of C.quadrangularis (10, 20, 30, 50, 100, 200 M) were used for a 24-hour treatment. After incubation, each well was replaced with 20 l of 5 mg/ml MTT stock solution and incubated for 4 hours at 37 °C. In order to quantify the absorbance at 570 nm using a microplate reader, the produced formazan crystals were first dissolved in DMSO (SpectraMax M5, Molecular Devices, USA). Cell viability (%) was calculated as a ratio of absorbance (A570) in treated cells to absorbance (0.1% DMSO) in control cells (A570). Based on comparisons between the treated control (DMSO) and the sample concentration required to lower absorbance by 50%, the IC50 value was determined. The following equation was used to determine the percentage of cells that were viable:

Cell viability (%) = {A570od of (sample)/A570 od of (control)} x 100.

RESULTS:

The MTT assay was used to determine the vitality of the cells. In addition, the measurement of IC50 value indicated that the C. quadrangularis stem extract has anticancer activity. This indicates that the active component concentration should lower cell viability to 50%. At 30 g/ml, however, the stem extract inhibits 50% cell growth (IC50 value). Based on the findings, it seems that herbal extracts may possess a cell cytotoxic action that is effective against breast cancer cell lines.

Similarly, morphological alterations with specific apoptotic hallmarks such as membrane blebbing, nuclear condensation, fragmented nuclei, and cell wall breakdown were identified under phase contrast microscopy. Which clearly demonstrates the anticancer potential of C. quadrangularis stem extract treatment for 24 hours on MCF-7 cell line.

Control *C.quadrangularis* stem extract

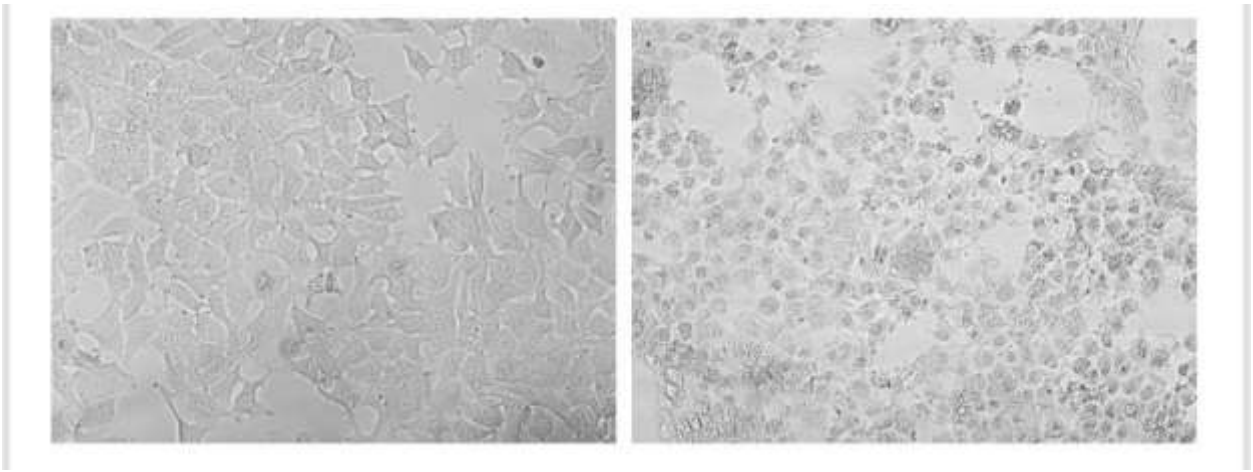

Figure1: Represents morphological changes that have taken place in a breast cancer cell line before and after treatment with CissusQuadrangularis at a concentration of 18 g/mL for 24 hours by Phase contrast microscopy at 20x magnification

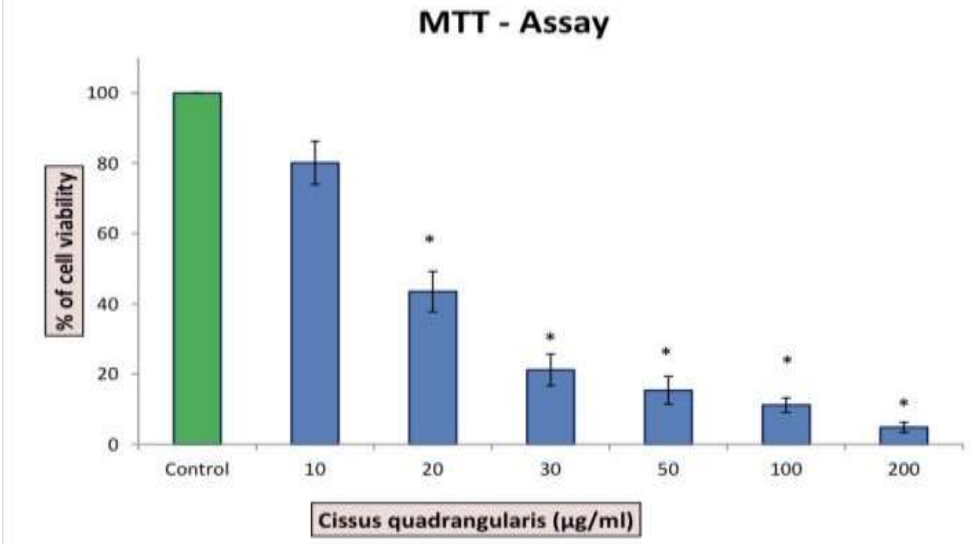

Figure 2: The MTT assay was used to evaluate the cytotoxic effects of C. quadrangularis stem extract on MCF-7 cells. The cells were treated with different concentrations (10, 20, 30, 50, 100, and 200 g) for 24 hours. The IC50 value of 18 g/ml, which was shown to have 50% inhibition, has been established and used in further research.
The data are presented as means standard deviations (n = 3), and a value of $p < 0.001$ indicates statistical significance when compared to the control-blank group.

DISCUSSION:

The cytotoxic activity of CQ extract against carcinomatous cells suggests that it might be used to treat skin cancer. Several studies demonstrated that the cytotoxic activity of the herb Cissusquadrangularis in multiple cell lines such as Norse deity, Vero, MCF7, computer memory unit oral epidermoid malignant neoplastic disease cells, and EAC (Ehrlich Pathological Carcinoma) cell line clearly suggests that it will be useful for the treatment of cancer such as hepato cellular carcinoma and cervical cancer.(8)This bioactive component found in plants will prevent carcinogenesis by inhibiting metabolic activation, enhancing detoxification, or providing alternative targets to electrophonic metabolites.(9,10). They will act by preventing the cooperation of substance cancer-causing agents or endogenous free revolutionaries with desoxyribonucleic acid, thereby reducing the degree of harm and materialising changes that contribute not only to tumor progression but also to reformist genomic shakiness and overall growth change. (9). This antiproliferative activity might be related to the nature of the chemicals contained in each crude extract and how they interact with the metabolic characteristics of each kind of cancer cell, or it could be due to the efficacy of specific enzymes that serve as antioxidants, particularly in cancer cells (3). Due to the absence of an in vivo investigation, the study's effectiveness cannot be determined. This opens the door for a variety of future investigations, such as evaluating

the activity of the medicine in in vivo tests and determining the potential adverse effects of the extract, among other things. Our team has extensive research experience as well as a depth of knowledge, both of which have culminated in the production of high-quality papers.(11–15),(16),(17),(18),(19),(20),(21),((13,22,23),(24–28),(29),(30).(31)(32)(33)(34)(34,35)(36)(37)(38)(39)(40)(41)(42)(43)(44)(45)(46)(47)

CONCLUSION:

The anticancer activity of Cissusquadranqularis (L) stem extracts was assessed in vitro using MTT assays in the current study. The investigation revealed that the MCF-7 breast cancer cells exhibited significant antiproliferative activity. Furthermore, future research should focus on elucidating the molecular mechanism behind these herbal extracts' cytotoxic and antiproliferative actions on cancer cells.

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