TECOMA STANS HYDRO ETHANOLIC LEAF EXTRACT ANTIOXIDANT AND ANTIPROLIFERATIVE EFFECT ON LUNG CANCER CELL LINE A-549.

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ABSTRACT

Background: Tumor is a disease caused by abnormal cells dividing out of control. Lung tumor is a type of tumor that primarily affects smokers. Coughing, wheezing, chest pain, and other symptoms of lung tumor include these. Tecoma stans, popularly known as yellow bells, flowering perennial shrub endemic to the United States that belongs to the Bignoniaceae family of trumpet vines. It possesses antimicrobial, antispasmodic, antidiabetic, antibacterial, and trypsin inhibitor effects, among other things.
Aim: to investigate on the lung tumour cell line A549, Tecoma stans hydroethanolic leaf extract has an antioxidant and anti-proliferative effect.

Materials and Methods:. The (A-549) human lung tumor cell line) was brought from NCCS, Pune, India. Cell viability test and Gene expression analysis for apoptotic activity were carried out using MTT and PCR respectively. The results were analyzed using appropriate statistical tools using ANOVA and Duncan's test.

Results: It is inferred that there is significant reduction in Bcl-2 and Bcl-xl mRNA expression was observed on induction of 300 and 400 μg/ml of *Tecoma stans*. The cell viability was also reduced on induction of the same.
Conclusion: This study has concluded that *Tecoma stans* might possess antioxidant and antiproliferative effect against lung tumor cell line A-549 therefore it can help in preventing tumour formation.
Keywords:Antioxidant; Antiproliferative**;** A-549; *Tecoma stans*; MTT assay; Bcl-2; Bcl-xl; Innovative.

INTRODUCTION:

Tumors are diseases that arise when abnormal cells divide out of control. Tumors can be caused by anything that causes normal body cells to develop abnormally. Exposure to chemical or poisonous substances, ionising radiation, genetics, or even viruses are some of the causes of tumours. There are many different forms of tumours, including breast tumours, kidney tumours, lung tumours, melanoma, oral tumours, and others. The unregulated division and proliferation of cells in the lungs causes lung tumours, which are more common in smokers. The two most common types of lung tumour are non-small cell lung cancer and small cell lung cancer. In the United States, lung tumours affect about 62 per 100,000 men and women.(1). Some of the less common indicators of lung tumour include swelling in the face or neck, difficulty swallowing or pain while swallowing, and changes in the appearance of fingers known as finger clubbing. Immunotherapy, chemotherapy, and other treatments are used to treat tumours. People who are in the early stages of a tumour can benefit from thoracoscopic surgery to decrease or cure their tumour. (2). The experience from our previous studies (3) (4,5) (4)(6)(7)(8)(9)(7,9)(10)(11) (12) have prompted us to concentrate on the current issue

Tecoma stans also known as yellow trumpet flower is a perennial shrub in the trumpet vine family.Tecoma stans, often known as yellow trumpet flower,perennial shrub, belongs to a trumpet vine family .Chemical compounds such as alkaloids,flavonoids,phenols,amino acids,glycoside etc are present,active constituents such as tecomine and tecipostanine are also present(13) (14) (15)(16) It's well-known for its therapeutic benefits.The aqueous extract of the flower of the plant has Antioxidant and Anti-proliferative property (17).According another similar article the leaves of this plant have trypsin

inhibitor activity (18). Tecoma stans flower's ethanolic extract shows antimicrobial action against human pathogenic microorganisms. (19).Similarly Mohamed Z.M et al has also proven that the leaves and branches have Antioxidant property by DPPH mode(20).It has been proven that *Tecoma stans* also has cytotoxic and antioxidant properties(21)**.**

The goal of this study is to demonstrate the antioxidant and anti-proliferative activities of Tecoma stans hydro ethanolic leaf extract against lung tumor, so that it can aid in the prevention or cure of lung tumor in the future, as well as drug development Studies at molecular levels were performed by our team of researches which insisted us to proceed this study.(22–29),(30),(31),(32),(33,34),(35),(36),(37–41) The primary goal of this research is to assess the antioxidant and antiproliferative properties of Tecoma stans hydro ethanolic leaf extract against a lung tumor cell line (A-549).

MATERIALS AND METHODS

The human lung cell lines (A549) were purchased form cellline centre, pune, India. At 37 degrees Celsius and 5% CO2, tissues were grown in RPMI media containing 10% foetal bovine serum, 100 U/ml penicillin and 100 g/ml streptomycin. The MTT test was used to measure cell growth. (A549) tissues were sown in 96-well plates with 5x104/200l and grown overnight.. As a vehicle control, tissues were treated with dimethyl sulfoxide (0.1 percent DMSO). Six duplicate wells were used in each treatment. All of the tissues were then grown for another 48 hours. The experiment was carried out three times. The MTT absorbance in negative control tissues was employed as a 0 percent cell inhibition measurement. The expression status of m RNA was analysed by Polymerase chain reaction for identifying the fold change of BCL2,BCL-Xl m RNA expression over control samples. The obtained date were analysed for its significance using one-way analysis of variance (ANOVA) and Duncan's multiple range test with significance at the 0.05 level.

RESULTS

Effect of *Tecoma stans* on the cell viability:

The cell viability of the lung tumor cell line (A-549) was determined using the MTT test after different dosages of Tecoma stans were administered. (Table-1) In lung tumor cells, cell viability was reduced in a based on different doses. When compared to control, the maximum suppression of cell growth and proliferation was seen at a concentration range of 300-400 g/ml of Tecoma stans employed.(Figure 1)

Effect of Bcl-2 mRNA expression on lung tumor cell line (A-549)(fold change over control)

Bcl-2 mRNA expression was assessed in a dose-dependent manner. At a dose of 300 **µ**g/ml of Tecoma stans, the cells that cause lung tumor were severely suppressed, and the mRNA expression of the Bcl-2 gene was shown to be dramatically reduced when compared to control. Furthermore, at a dosage of 400 **µ**g/ml, there was a substantial drop in Bcl-2 mRNA expression when compared to control. As a result, it was deduced that the decrease in Bcl-2 gene expression was dose-dependent. (Figure -2)

Effect of Bcl-xl mRNA expression on lung tumor line (A-549),(fold change over control)

Bcl-xl mRNA expression was assessed in a dose-dependent manner. At a dose of 300 **µ**g/ml of Tecoma stans, the cells that cause lung tumor were severely suppressed, and the mRNA expression of the Bcl-xl gene was significantly reduced as compared to control. Furthermore, at a dosage of 400**µ**g/ml, there was a

substantial drop in Bcl-xl mRNA expression when compared to control. As a result, it was deduced that the reduction in Bcl-xl gene expression was dose dependent.(Figure 3)

Table 1: Effect of *Tecoma stans* on cell viability

Tecoma stans concentration	Cell viability%
0	100
100	85
200	70
300	60
400	50
500	45

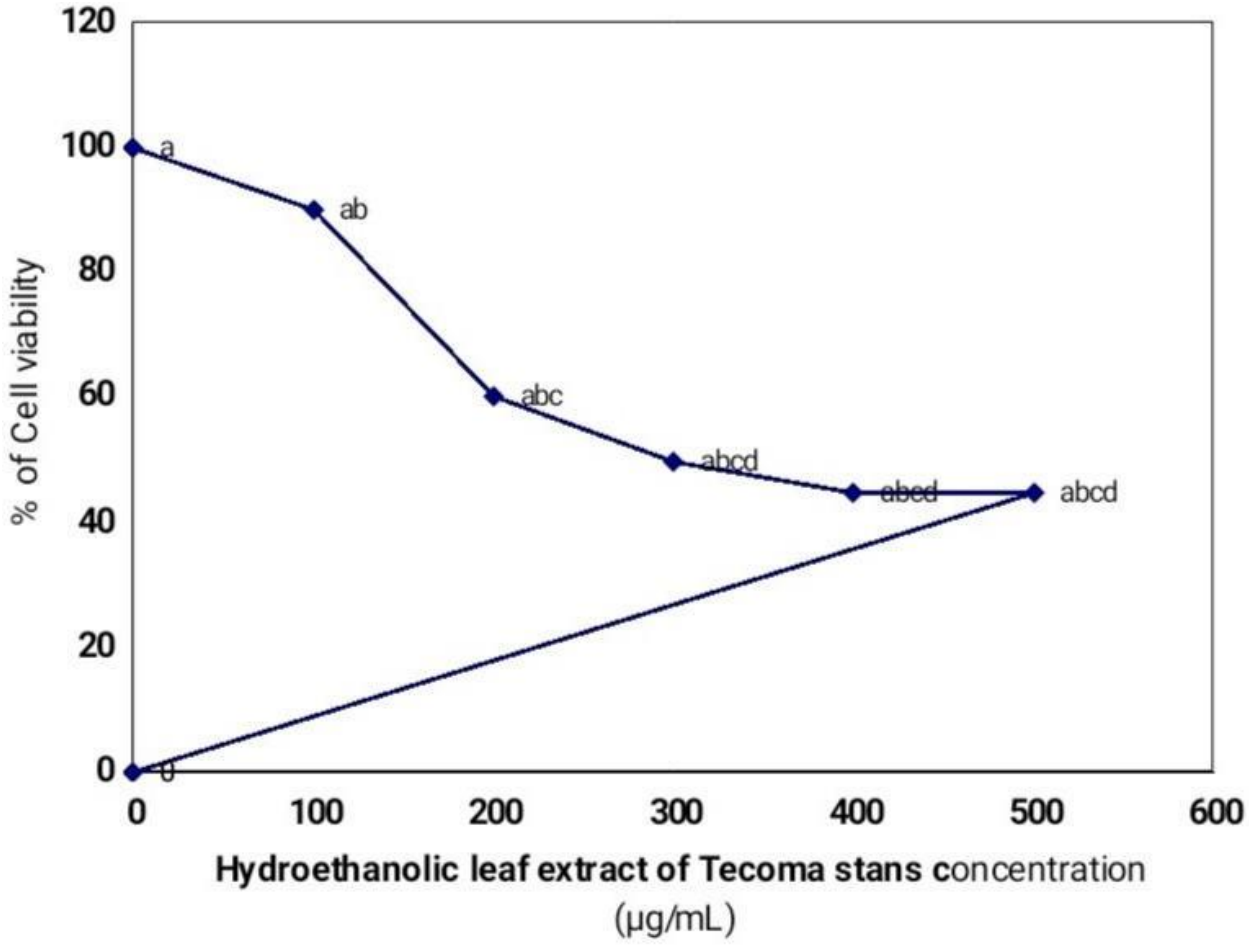

Fig.1 :Effect of Tecoma stans hydroethanolic leaf extract on cell viability in A549 cells.

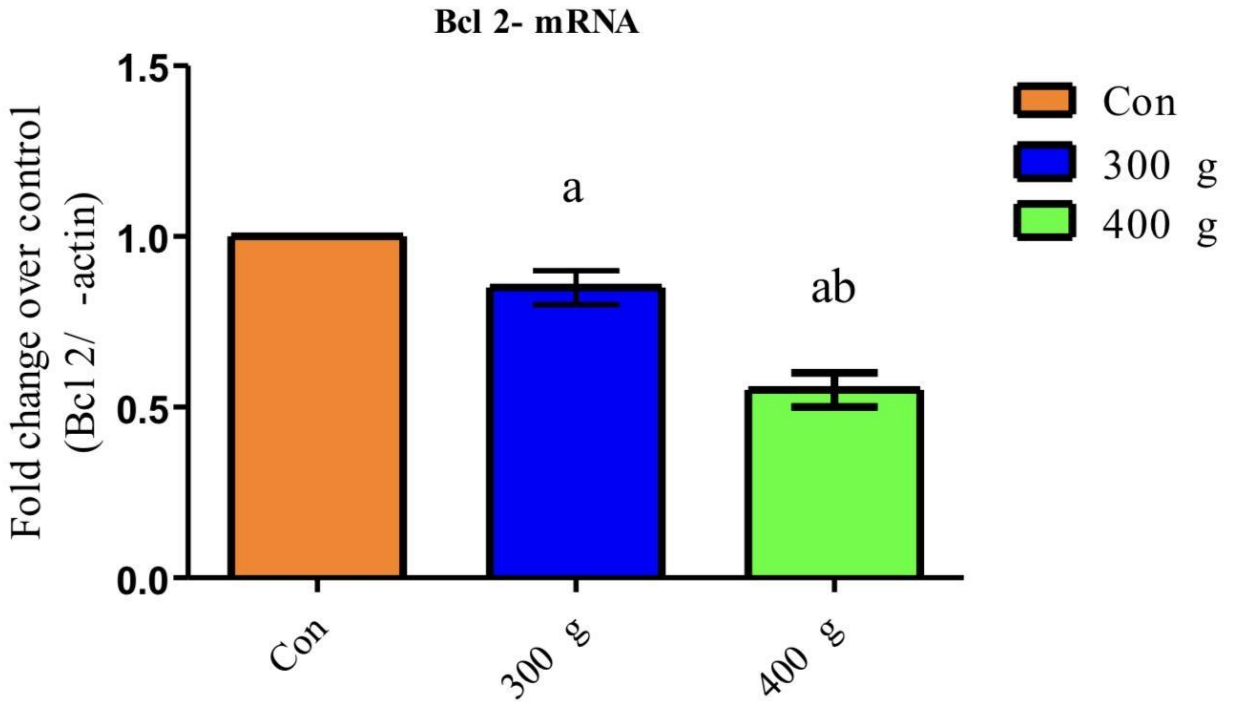

Fig 2 : Effect of Tecoma stans hydroethanolic leaf extract on Bcl-2 mRNA expression in A549 cells.

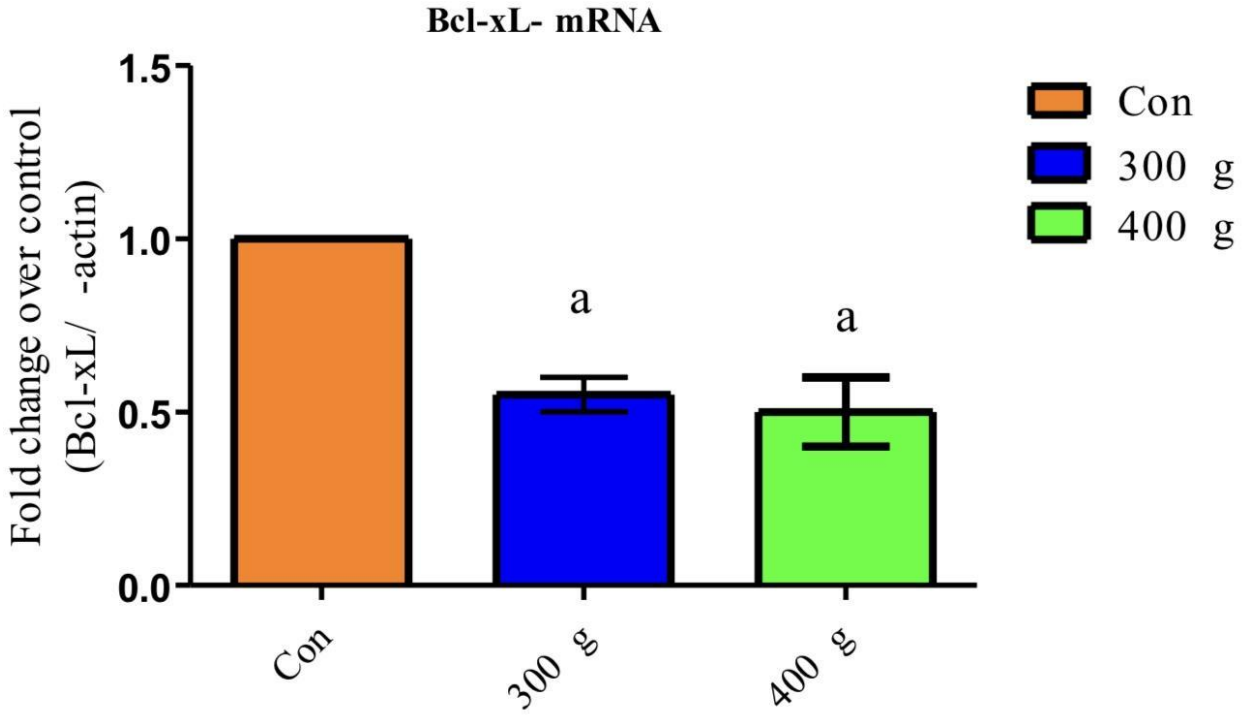

Fig 3 : Effect of Tecoma stans hydroethanolic leaf extract on Bcl-xL mRNA expression in A549 cells.

DISCUSSION

Induction of Tecoma stans at 300 and 400 **µ**g/ml in a lung tumor cell line (A-549) resulted in a reduction Bcl-2 and Bcl-xl gene expression.Cell viability was assessed using modified calorimetric technique and from this it was inferred that cell viability had decreased.This decrease in cell viability led to a steep decrease in cell proliferation.

It was inferred from our study that *Tecoma stans* has the property to act as an antioxidant and antiproliferative agent in Lung tumor.300 and 400 **µ**g/ml of *Tecoma stans* was induced in this study.According to another research it was proven that *Tecoma stans* can act as an Antioxidant and Antiproliferative agent against a different cell line Hep-G2 and MCF-7 as well.(17)

Induction of Tecoma stans may inhibit cell growth, according to the findings of this study. Bcl-2 is an antiapoptotic gene that keeps cells from dying. Different doses of Tecoma stans dramatically reduced Bcl-2 mRNA gene expression, resulting in an increase in programmed cell death and, as a result, a reduction in tumour development. According to Ma Ming et al in their study the expression of miRNA-125p was reduced in people with hepatocellular carcinoma.It was said that by targeting the Bcl-2 gene expression the proliferation of hepatocellular cells can be inhibited thereby reducing tumour formation.(42)

Bcl-2 gene expression is being targeted therefore JiaNan Ji et al. advised using Tetrandrine, which has an antitumor impact as one of its features, in their investigation (43). A balanced expression of pro-apoptotic and antiapoptotic genes controls apoptosis i.e programmed cell death.It was also reported that Bcl-2 can act as a good target which can help in inhibiting tumours not only in lung tumor but also many other tumors (44). Bcl-2 pro survival proteins if targeted can help is alteration of tumour formation and in tumor therapies.Furthermore in the future it can be used in manufacturing medicines according to jm adams et al in their study.(45) Many small molecular drugs have been made to target the Bcl -2 pathway as it can lead to the reduction of tumor.After many researches increased knowledge about this pathway can help in clinical application.(46)

Induction of Tecoma stans may inhibit cell growth, according to the findings of this study. Bcl-xl is an Antiapoptotic gene which prevents programmed cell death.Induction of different doses of *Tecoma stans* significantly down regulated the mRNA gene expression of Bcl-xl and thereby lead to increase in programmed cell death which inturn led to reduction in tumour formation. According to Jayachandran, Phillip robinson et al the antitumor activity of *Tecoma stans* might be due to free radical scavenging and antioxidant activity.Their results concludes that *Tecoma stans* can help in curing lung tumor (21)Sophie de carne et al in 2017 in their study reported that Tumor cell stemness can directly regulate the RAS signalling which favours cell stemness (47)

In early days Bcl 2 family genes which includes Bcl-xl were thought to help only in apoptosis but recent studies have proven that they can regulate tumor as well(48).Bcl-xl is a key factor in the spread of breast tumor to other organs (49).The sample size of this study was extremely small, which was one of its drawbacks. Future studies will further help to strengthen the antioxidant and antiproliferative properties of *Tecoma stans.*

CONCLUSION:

Therefore in this study we have concluded that *Tecoma stans* has antioxidant and antiproliferative effect against lung tumor cell A-549.It inhibits the antiapoptotic proteins Bcl-2 and Bcl-xl, lowering cell counts and, as a result, tumour growth and tumor.

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CONFLICT OF INTEREST :

All the authors declare that there was no conflict of interest in the present study.

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