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Research Article

Selective Cytotoxicity of *Ficus Benjamina* Leaf Extract Against Lung Cancer Cells

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Abstract

This study examines the inhibitory effects of chloroform extract (samples A, B, C, D and E) from *Ficus benjamina* leaves as a cancer treatment by comparing them to the anticancer medicine, Bortezomib (BTZ), and evaluating their effects on lung cancer cell lines. Sample A is the crude chloroform extract from *Ficus benjamina* leaf; samples B to E are different fractions derived through flash chromatography of the crude chloroform extract. Positive control was Bortezomib and negative control was Dimethyl sulfoxide (DMSO). The test samples were used at two concentrations of 10 µg/ML and 50 µg/ML. BTZ was tested at 1 µM and DMSO at 1 %. According to the findings, sample C showed significant ($p<0.05$) inhibition of cancer cell lines at 50 µg/ML. The extract's inhibitory activity, however, was shown to be less than that of BTZ. Increased concentrations of the extract showed increased inhibitory activity, supporting the finding that the inhibitory effect of the extract is concentration dependent. At a concentration of 10 µg/ML, extracts A, C, D, and E significantly inhibited lung cancer cell lines as compared to extract B that did not. At both concentrations of 10 µg/ML and µ50 g/ML, the inhibition displayed by bortezomib was noticeably higher than that of all the samples of the chloroform extract of *Ficus benjamina* leaves. At a concentration of 50 µg/ML, extract C showed a much greater percentage of inhibition against the lung cancer cell lines. Overall, the study shows that *Ficus benjamina* leaves may be used as an anticancer drug. Sample C showed selective cytotoxicity against the cancer cells while sparing healthy human embryonic kidney (HEK) cells. The extract also exhibits a better therapeutic index than Bortezomib, indicating the possibility of a targeted cancer medication with fewer side effects. To clarify the underlying mechanisms and determine clinical feasibility, more study is required. These results highlight the promise of *Ficus benjamina* leaf extract in the treatment of cancer, but they also highlight the need for further research to fully comprehend its potential.

Keywords: *Ficus benjamina*; Lung cancer; Cytotoxicity; Bortezomib; Chloroform extract.

Introduction

The biggest cause of cancer-related mortality and a major strain on healthcare systems globally [1,2], lung cancer is a global health concern [3,4]. Small cell lung cancer

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(SCLC) and non-small cell lung cancer (NSCLC) are the two main forms, and they are both characterized by unchecked cell development in the lung tissue [5].

NSCLC, whose main subtypes include adenocarcinoma, squamous cell carcinoma, and giant cell carcinoma [6], makes for around 85% of all instances of lung cancer [5]. The remaining 15% of cases, however, are SCLC, which is distinguished by its aggressivity and quick metastasis [6]. The most well-known risk factor for lung cancer is tobacco use, which contributes to the disease's complex etiology [7].

According to Samet, et al.,[8] and Loomis, et al.,[9] lung cancer development is also influenced by exposure to environmental contaminants like radon and asbestos. An individual's vulnerability to this cancer might also be increased by underlying lung conditions and genetic predisposition [10,11]. As supplied by Siegel, et al., [4] in 2021, the overall prognosis for lung cancer remains poor, with a five-year survival rate of less than 20% for all stages taken together, despite gains in our understanding of the illness and advancements in early diagnosis and treatment modalities [12]

A personalized strategy based on the genetic profile of each patient's tumor has changed lung cancer treatment in recent years thanks to the development of precision medicine [13]. Despite these developments, a few obstacles still exist, including medication resistance [14], the lack of efficient early detection techniques [15], and the treatment options for some subtypes of lung cancer [16].

This investigation intends to offer a thorough examination of the potential of the chloroform extract of *Ficus benjamina* leaf in treating lung cancer. We will examine the important areas of exploration, recent developments, difficulties, and potential future directions in the research on this herbal compound currently underway.

Our objective is to illuminate the advancements and highlight areas that need more research by comprehending the complicated terrain of *Ficus benjamina's* impact on lung cancer. In the end, our goal is to contribute to the creation of efficient interventions that can lessen the impact of this terrible disease on the entire world.

Herbal agents in cancer treatment

Historical perspectives

Herbal medicine as we know it now has evolved because of the historical usage of herbal agents in traditional medical systems, which has roots in many different cultures and historical eras [17,18]. These ancient medical systems understood the medicinal value of plants in curing a variety of diseases, including cancer [19-21]. Herbal medicines have long been used in Traditional Chinese medicine (TCM) to treat illnesses including cancer [22,23].

Herbs are used for their medicinal benefits in ancient manuscripts like the "Shennong Ben Cao Jing" (The Divine Farmer's Materia Medica). For instance, historically, herbs like *Scutellaria baicalensis* [24] and *Astragalus membranaceus* [25] have been used to help cancer patients and improve general wellbeing. Ayurveda is a traditional medical practice from India that has been using herbs for thousands of years [26,27].

Ayurvedic medicine has used herbs like turmeric [28] and ashwagandha [29] to treat

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a variety of illnesses, including cancer. Curcumin, the main ingredient in turmeric, is especially well known for its anti-inflammatory and possibly anticancer qualities. Herbal medicine has a long history in Native American societies all over North America [20]. Numerous native plants, including echinacea (used to bolster the immune system) [30] and chaparral (used for its alleged anticancer properties) [31], have historically been used to treat a variety of health conditions, including cancer.

Ancient Egyptian historical documents attest to the usage of botanicals like aloe vera for therapeutic purposes [21]. Aloe vera has been known to provide medicinal benefits for treating skin disorders as well as perhaps other health issues, such as those connected to cancer signs [32]. Herbal medicine had a significant role in ancient Greece and Rome's healthcare systems. According to Dioscorides, et al., [33] and Hippocrates, et al., [34] were among the medical professionals who recorded the use of herbs like *Vinca rosea* [10,35] for its potential to relieve a variety of symptoms, including those related to cancer.

Contemporary applications

Modern cancer therapy strategies have been profoundly influenced by traditional understanding of herbal treatments [36,37]. Modern medicine has a solid foundation because of the knowledge that has been passed down through the generations in diverse civilizations [38].

Discovery of active compounds

Traditional herbal treatments are the source of many contemporary cancer medications [39]. Traditional knowledge, for instance, served as inspiration for the discovery of the anticancer characteristics of substances like paclitaxel (derived from the Pacific yew tree) [40] and vinblastine (derived from the periwinkle plant) [41].

Complementary therapies

Horneber et al., [42] supply that integrative and complementary cancer therapies for cancer have been made possible by traditional herbal medicines. Nowadays, patients frequently combine herbal supplements with conventional treatments to control side effects, increase immunity, and enhance general health.

Targeted therapies

The hunt for herbs with specific anticancer characteristics has been aided by traditional knowledge. For instance, research is being done on the turmeric compound curcumin to see if it can inhibit the development of cancer cells and inflammation [43].

Supportive care

In modern cancer treatment, herbal treatments are utilized to reduce symptoms and enhance patients' quality of life. For example, ginseng and ginger can aid with chemotherapy-related nausea and exhaustion [44].

Inspiration for research

Scientific inquiry into the mechanisms of action of diverse herbs has been motivated by traditional herbal practices [45]. The creation of new cancer treatments is aided by this study.

Alongside conventional cancer treatments, the incorporation of herbal medicine into complementary and alternative medicine (CAM) is important, as supplied by authors like Eisenberg, et al.,[46].

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CAM refers to a variety of alternative cancer treatment methods that are used together with or in addition to standard medical care [47], such as herbal therapies [48].

Symptom management

In CAM, herbal therapy is frequently used to treat symptoms of cancer, such as pain, nausea, and exhaustion. Herbs like chamomile, ginger, and turmeric can help reduce these negative effects and enhance the patient's general health [44].

Support for immunity

Echinacea and astragalus are two herbal supplements that are thought to strengthen the immune system [49]. These plants are used in CAM to strengthen the body's defenses while receiving cancer therapy.

Quality of life

CAM, including herbal treatments, places a strong emphasis on enhancing cancer patients' quality of life. Reduced stress, greater sleep, and enhanced emotional wellbeing can all be attributed to herbal therapy [50].

Reducing treatment negative effects

The potential for herbal medications to lessen the negative effects of traditional cancer therapies including chemotherapy and radiation therapy is being investigated. Ginseng, for instance, might be able to lessen the weariness brought on by cancer treatments [51].

Enhancing general wellness

CAM understands the significance of a comprehensive strategy for cancer treatment. Integrating herbal medicine supports a patient's wellness on all levels-physical, emotional, and psychological [52].

Potential mechanisms

The potential processes by which herbal medicines can affect cancer cells have been shown [53-55]. Depending on the herb in question and its bioactive components, these methods can vary, however some typical ways that herbal medicines may affect cancer cells include: Many herbs have a lot of antioxidants, like flavonoids and polyphenols, which help scavenge dangerous free radicals and lessen oxidative stress [56]. This can lessen the chance of the development of cancer and shield cells from DNA damage.

Effects on inflammation

Cancer growth and progression are both correlated with chronic inflammation. Some plants, such as ginger and turmeric (curcumin), have anti-inflammatory qualities that can block pro-inflammatory pathways and lessen inflammation that promotes cancer [43].

Apoptosis induction

Herbal substances can cause cancer cells to undergo programmed cell death (apoptosis). For instance, catechins, which are found in green tea and ginkgo biloba, have been investigated for their potential to induce apoptosis in cancer cells [57].

Cell cycle regulation

Herbal substances can control the cell cycle to stop unnatural cell growth [58]. This includes stopping the proliferation of cancer cells by causing cell cycle arrest in the G0/G1 phase [59] or the G2/M phase [60].

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Angiogenesis inhibition

Some plants, such as Japanese knotweed and the resveratrol in red wine, exhibit anti-angiogenic effects [61]. By preventing the creation of new blood vessels, they can restrict the blood supply to tumors and impede their growth.

Immune system modulation

Some herbs, like astragalus and echinacea, may enhance the body's capacity to identify and target malignant cells by boosting the immune system's reaction to cancer cells [62].

Metastasis inhibition

Herbal remedies can thwart the spread of cancer cells to other organs by interfering with the metastasis process. Green tea polyphenols, for instance, have demonstrated promise in preventing metastasis [63].

DNA repair and epigenetic regulation

Some herbal chemicals may affect epigenetic alterations and DNA repair pathways, potentially reversing or preventing changes in gene expression linked to cancer [64].

Hormone regulation

Some herbs, including black cohosh, may have an impact on hormone levels and receptors, which may be important for cancers like breast and prostate cancer that are influenced by hormones [65]. Herbal phytochemicals including flavonoids, polyphenols, and alkaloids have a remarkable ability to target a few pathways vital to the initiation and advancement of cancer. These bioactive substances exert their various anti-cancer effects via a variety of methods. First, by interfering with the cell cycle, stopping cells in particular phases, and limiting unchecked proliferation, they can reduce the growth of cancer cells [66]. This slows the growth of malignant populations. Second, a lot of phytochemicals have anti-angiogenic qualities that prevent the growth of new blood vessels, which tumors need to survive [67]. This prevents metastasis and tumor growth. Additionally, these substances frequently show strong antioxidant activity, preventing oxidative stress and minimizing DNA damage that can lead to cancer [68].

This antioxidant defense helps to stop the development of cancer. Additionally, phytochemicals are well-known for their anti-inflammatory properties [69], which suppress pro-inflammatory pathways and lessen chronic inflammation that has been associated to the growth of cancer. This anti-inflammatory effect prevents the invasion and growth of tumors. Some phytochemicals cause cancer cells to undergo apoptosis, or programmed cell death, which kills the cancer cells while sparing the healthy ones [70].

These substances may also alter cancer-related signaling pathways and gene expression, affecting functions like DNA repair, hormone regulation, and immune system operation [71].

Ficus benjamina

The weeping fig, often known as the ficus tree or simply as *Ficus benjamina*, is an evergreen shrub in the family Moraceae. Popular evergreen *Ficus benjamina* trees and shrubs are distinguished by their lovely, hanging branches and glossy, elliptical leaves [72]. In its natural habitat, it can grow to be a big tree, however it is frequently

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cultivated as a smaller indoor or outdoor ornamental plant.

Although there are varieties with variegated foliage as well, the leaves are normally dark green. Small, inconspicuous blooms and fig-like fruits, which are not normally eaten, are produced by the plant [73]. Numerous bioactive substances are found in *Ficus benjamina*, including but not restricted to flavonoids, these have a reputation for being powerful antioxidants and having possible health advantages [74]; polyphenols, these substances have been investigated for their possible role in health promotion [75] terpenoids, some of the terpenoids in *Ficus benjamina* may have therapeutic benefits [76]; and alkaloids, an extensive class of substances, alkaloids can have a range of biological effects [77]. Depending on the plant's age, the surrounding environment, and the portion of the plant being examined, these chemicals' precise composition and concentration can change. Although there is little scientific evidence to support many of these uses, different portions of the *Ficus benjamina* have historically been employed in traditional medical systems in different parts of the world for a variety of purposes. Some of these include wound Healing, *Ficus benjamina* leaf or latex extracts have been applied topically to wounds in several cultures to aid in the healing process [78] respiratory health, *Ficus benjamina* leaf preparations have been used in traditional medicine to treat respiratory conditions like coughs and bronchitis [79] anti-inflammatory, although further scientific research is necessary, certain traditional practices have used *Ficus benjamina* for what may be its anti-inflammatory effects [80]; and health of the gastrointestinal tract, *Ficus benjamina* extracts have been utilized in some areas to treat digestive issues like diarrhea and stomach aches [81]. In this review, Obafemi, et al., [82] highlighted *Ficus benjamina* and many other plants with anticancer properties.

They were able to bring to limelight several attributes that make *Ficus benjamina* a good candidate for cancer therapy. Recent research [83,84] has revealed its potential as an herbal agent under investigation for anticancer therapy and cancer cytotoxicity, notwithstanding its historical usefulness as an indoor or outdoor beautiful plant for decoration. *Ficus benjamina* is of importance because of the wide range of phytochemicals it contains, including flavonoids, polyphenols, alkaloids, and terpenoids [85]. In preclinical investigations, these bioactive components showed promise in their capacity to target cancer cells [84] using a variety of pathways. In traditional medicine, *Ficus benjamina's* leaves, bark, roots, and fruits have been used for a variety of treatments, including the treatment of wounds, fever, and diarrhea [83].

The plant's extracts have also been demonstrated to have anti-inflammatory and antioxidant effects [86], making them a promising subject for further study in the creation of pharmaceuticals [87]. *Ficus benjamina* has been studied for its potential to prevent the growth of cancer cells, cause apoptosis (programmed cell death), modify the progression of the cell cycle, and have an impact on signaling pathways involved in the development of cancer [84].

Investigations have also focused on its ability to selectively target cancer cells while sparing healthy ones [84], suggesting potential for less side effects compared to conventional treatments. The plant's

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extracts have also shown cytotoxic effects against different cancer cell lines when used in appropriate concentrations, making them a potential for further investigation in the field of cancer therapy [84]. Although the preliminary results are encouraging, it's crucial to keep in mind that more in-depth investigations, such as in vivo and clinical trials, are required to completely unravel the mechanisms of action and assess its safety and efficacy for the treatment of human cancer.

Materials and methods

Chemicals

All solvents and chemicals used in the present study such as chloroform, distilled water, methanol, and iodine were of analytical grade. The solvents used for extraction and flash chromatography are methanol and chloroform. Methanol, chloroform and iodine were used for the Thin Layer Chromatography (TLC) protocol. Dimethyl Sulfoxide (DMSO) and Bortezomib (BTZ) were the respective negative and positive controls in the cancer cell line testing.

Plant Sample, extraction and chromatography

Fresh leaves of Ficus benjamina was collected from South-Western Nigeria. The plant leaves were identified and classified at the University of Ibadan herbarium. After this, the leaves were rinsed under running water and then with distilled water to remove dust. The samples were dried under shade at room temperature for 8 days, all the while turning the parts over to prevent mould growth. About 150g of the leaf samples were ground to fine powder for extraction using a grinder machine (Jaipan Super Deluxe) for 30m seconds. The ground powder was extracted using chloroform as extraction solvent following the principles of Samarakoon et al. [88].

All extractions from the leaf powder of *Ficus benjamina* were done using the separatory funnel apparatus/procedure. The solvent used for the extraction is 50/50 chloroform/water (150 ml chloroform/150 ml water). Flash chromatography of the chloroform extract of *Ficus benjamina* leaf was done using 100% chloroform; 1% methanol/ 99% chloroform; 2% methanol/ 98% chloroform; 10% methanol/ 90% chloroform; and 30% methanol/ 70% chloroform in progression down the column.

Cytotoxicity screening

The in vitro cytotoxic activity of test samples was evaluated using the Cell Titre-Glo Assay.

Cell culture

The lung cancer cells (A549) were cultured in F12K+10% FBS medium in 150 cm2 flasks at 37°C in a 5% CO_2 atmosphere. Medium was changed every 2 days until cells were confluent. Confluent cells were harvested after treatment with Trypsin-EDTA. Cells were then plated in 96-well tissue culture plates at seeding density of 8 x 104 cells/mL so that each well contained 4000 cells in 50 µL of the medium.

Treatment with test samples

Briefly, 50 µL of fresh F12K+10% FBS containing 2X final concentration of the test sample with 2% DMSO was added to cells in 50 µL of F12K+10% FBS already in each well to obtain the final concentration of the test sample with 1% DMSO. Treated cells were incubated for 48 hours at 37°C in a 5% CO_2

atmosphere. After equilibration at room temperature for 30 minutes, 100 µL of Cell Titre-Glo 2.0 reagent (Promega) was added, the content was mixed by shaking for 2-3 minutes on a shaker, and then incubated at room temperature for 10 minutes. The luminescent signal produced was measured using a micro-plate luminometer (Tecan Infinite M1000 Pro) with 500 ms integration time per well. The experiment was performed in triplicate. The culture medium (F12K+10% FBS) was used as blank while the final concentration of DMSO (1%) in media was used as negative control. Bortezomib at 1 µM was used as a positive control. The percent inhibition or decrease in cell viability was calculated using the formula:

$$\textbf{Inhibitory activity (\%)} = \frac{\text{Control group LO} - \text{Test Group LO}}{\text{Control group LO}} \times 100$$

LO=Luminescence output.

Compounds showing ≥ 50% inhibition were further processed for IC50 determination.

Statistical analysis

Inhibitory potential was determined in triplicate; the mean of the triplicate value was determined using simple descriptive statistics. Statistical significance was determined using analysis of variance (ANOVA). The result was considered significant when $p<0.05$. Data was collected using Microsoft Excel and all analysis was performed using Statistical Package for Social Sciences (SPSS, IBM ver. 23).

Result

Inhibitory potential of *Ficus benjamina* against Lung Cancer Cell Lines

The findings, as displayed in Table 1 and Figure 1, show that different levels of inhibitory activity against lung cancer cell lines were displayed by the leaf extract. At a concentration of 10 µg/ML, the extract samples labelled A, C, D, and E showed significantly more inhibition than Extract B ($p<0.05$).

Extract/Control	Sample A-E (10 µg/ML)	Sample A-E (50 µg/ML)
DMSO	**0.00 ± 0.00**	**0.00 ± 0.00**
BTZ	93.39 ± 7.29^{a}	93.39 ± 7.29^{a}
A	5.89 ± 0.17^{b}	10.29 ± 0.24^{c}
B	-4.92 ± 0.41^{c}	-6.86 ± 0.03^{e}
C	8.44 ± 0.48^{b}	43.19 ± 0.89^{b}
D	2.59 ± 0.23^{b}	9.05 ± 0.03^{c}
E	3.25 ± 0.05^{b}	6.51 ± 0.02^{c}

Table 1: Percentage Inhibition of Lung Cancer cell lines. BTZ=Bortezomib; DMSO=*Dimethyl sulfoxide (Negative control)* Samples A-E are extracts of *Ficus benjamina* leaf. Results are mean ± Standard Error of Mean of triplicate treatment.

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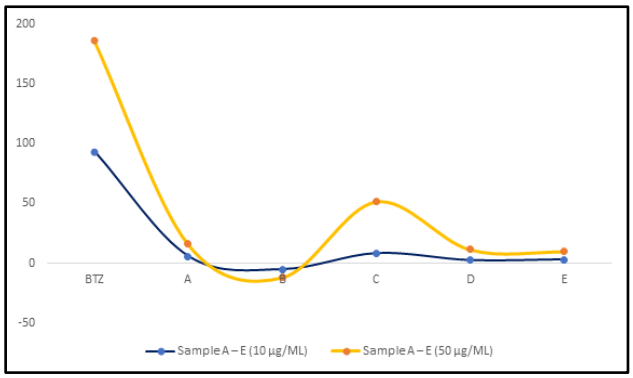

Figure 1: Percentage Inhibition of Lung Cancer cell lines. BTZ=Bortezomib; Samples A-E are extracts of *Ficus benjamina* leaf. Results are mean ± Standard Error of Mean of triplicate treatment.

Comparing the chloroform extract of *Ficus benjamina* leaves to the positive control medication, Bortezomib, at a concentration of 1µM, revealed a considerably greater degree of inhibitory action by the control medication than the extract. Additionally, it was discovered that the inhibitory effects displayed by the extract samples (A, B, D and E) were based on concentration. Except for extract B, which showed no significant inhibition ($p>0.05$) against the lung cancer cell lines, the percentage of inhibition of lung cancer lines at a dose of 50 µg/ML was higher than inhibition at 10 µg/ML for samples A, C, D and E. Furthermore, Bortezomib demonstrated a considerably higher percentage of inhibition compared to the chloroform extracts of *Ficus benjamina* leaves at both concentrations of 10 µg/ML and 50 µg/ML, Bortezomib. At a concentration of 50 µg/ML, sample C showed a much higher percentage of inhibition against the lung cancer cell lines than all other samples (A, B, D and E).

Biologic Activity (selective cytotoxicity) of *Ficus benjamina*

Table 2 and Figure 2 display the cytotoxic activity of various samples (A E) of *Ficus benjamina* leaf extract at two different concentrations (10 µg/ML and 50 µg/ML) on human embryonic kidney cells in comparison to a control drug, Bortezomib (BTZ). Based on three treatments, the mean values and standard error of mean (SEM) are displayed for the results.

Extract/Control	Sample A-E (10 µg/ML)	Sample A-E (50 µg/ML)
BTZ	68.27 ± 0.31a	68.27 ± 0.31a
A	-42.74 ± 0.37b	-29.78 ± 0.05b
B	-43.76 ± 0.43b	-42.65 ± 0.19b
C	-25.34 ± 0.58b	24.59 ± 0.40b

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D	-25.46 ± 0.83b	-31.03 ± 0.32b
E	-23.46 ± 0.03b	-21.2 ± 0.44b
Mean	-32.15 ± 0.45	-20.01 ± 0.28

Table 2: Cytotoxic activity of *Ficus benjamina* extract on Human Embryonic Kidney cells BTZ BTZ=Bortezomib; Samples A-E were extracts of *Ficus benjamina* Leaf. Results are mean ± Standard Error of Mean of triplicate treatment.

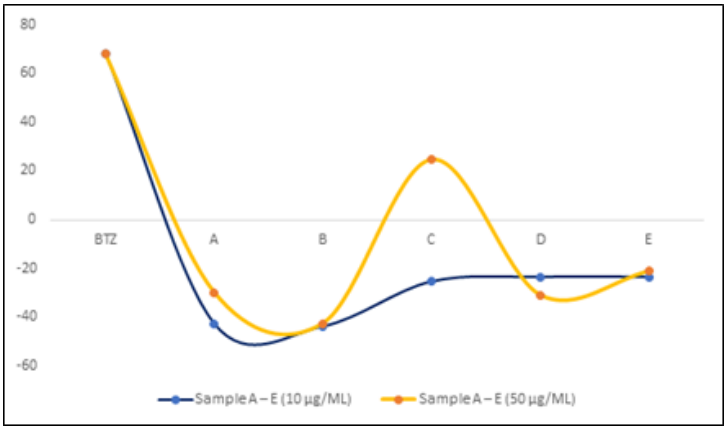

Figure 2: Cytotoxic activity of extract on Human Embryonic Kidney cells.

Discussion

Inhibitory potential of *Ficus benjamina* against Lung Cancer Cell Lines

Examining the possible anticancer activity of chloroform extract of *Ficus benjamina* leaves on lung cancer cell lines was the goal of the current investigation. The extract's ability to suppress cell growth was evaluated by comparing it to the conventional anticancer medicine Bortezomib at a concentration of 1 mM, as well as the extract at two different concentrations (10 µg/ML and 50 µg/ML) as shown in Table 1 and Figure 1. Five different uses of the extract, designated as Samples A through E, were made.

The results of this study, which assessed a chloroform extract of *Ficus benjamina* leaves for possible anticancer activity on lung cancer cell lines (A549), showed that the *Ficus benjamina* leaf extract exhibits inhibitory action against lung cancer cell lines. This suggests that *Ficus benjamina* leaves may be used as an anticancer drug. Studies have asserted that the plant of the genus Ficus have numerous pharmacological potentials, anti-tumor inclusive. The result of lung cancer inhibition of the chloroform leaf extract of *Ficus benjamina* as observed in the current study also agrees with that assertion, thus, is in congruence with the submission of Alsaweed [89].

It was discovered that the inhibitory action was concentration-dependent, with higher extract concentrations producing more inhibitory activity. At a concentration of 10 µg/ML, the lung cancer cell lines were substantially more inhibited by extracts A, C, D, and E than by extract B ($p>0.05$), which exhibited no significant inhibition.

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Furthermore, the result of the current study demonstrates that Bortezomib had significantly higher inhibitory activity than the chloroform extract of *Ficus benjamina* leaves, even when the extract concentration was at 50 µg/ML. However, extract C demonstrated a significantly higher percentage of inhibition against the lung cancer cell lines at a concentration of 50 µg/ML.

Biologic activity (selective cytotoxicity) of *Ficus benjamina*

BTZ (Control) shows the same 68.27 ± 0.31 cytotoxic activity on the human embryonic kidney cells at both 10 µg/ML and 50 µg/ML concentrations. The cytotoxic activity of *Ficus benjamina* leaf extracts (Samples A through E) changed depending on the concentration (10 µg/ML and 50 µg/ML) used. Negative values imply that all samples (A through E) have less cytotoxic activity than the control (BTZ). Out of all the samples, Sample A exhibits the greatest reduction in cytotoxic activity. It is-42.74 ± 0.37 at 10 µg/ML and -29.78 ± 0.05 at 50 µg/ML. The cytotoxicity of samples B, C, D, and E is likewise lower than that of the control. Samples C, D, and E are marginally less cytotoxic than Sample A, although Sample B is comparable to Sample A in this regard. All things considered, Sample A exhibits the greatest reduction in cytotoxicity at both concentrations, followed by Sample B. Samples C, D, and E exhibit less noticeable reductions in cytotoxicity. The values are significantly different from the control (BTZ), but not statistically different from one another, as indicated by the "b" next to the numbers.

The average values demonstrate that the leaf extracts of *Ficus benjamina* generally decrease cytotoxic activity; this reduction is more noticeable at 10 µg/ML (-32.15 ± 0.45) than at 50 µg/ML (-20.01 ± 0.28). This means that the extract has no harmful effect on the normal body cells while attacking the cancer cells, selective cytotoxicity.

Conclusion

In conclusion, the current study's findings support the possible application of a chloroform-based extract of the *Ficus benjamina* leaf as a cancer treatment. The results from the lung cancer cell lines and HEK cells demonstrate that the extract has the potential to selectively inhibit cancer cells while leaving normal cells unharmed. The extract appears to have a better therapeutic index than the positive control medicine, Bortezomib, according to the study, which is encouraging evidence for the extract's potential as a cancer treatment. To completely comprehend the mechanism of action and potential for clinical usage, more study is necessary.

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