LIST OF ABBREVIATIONS

NSCLC – Non- small cell lung cancer

SCLC - Small cell lung cancer

GLOBOCAN: Global Cancer observatory

ROS - Reactive oxygen species

Apaf-1 - Apoptotic protease-activating factor-1

PARP – Poly-ADP ribose polymerase

ADC – Adenocarcinoma

TK- Tyrosine kinases

EGFR – Epidermal growth factor receptor

PI3K/Akt - Phosphatidylinositol 3-kinase

FDA – Food and drug administration

VEGF – Vascular endothelial growth factor

Paclitaxel- PXT

Gemcitabine – GEM

DPPH - DPPH (2, 2-diphenyl-1-picrylhydrazyl) assay

MTT – (3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide

DMSO- Dimethyl sulphoxide

PEBE – Petroleum ether bark extract

CBE- Chloroform bark extract

PBS- Phosphate buffer saline

DCF-DA- 2′, 7′-dichlorodihydrofluorescein diacetate

DAPI- 4',6-diamidino-2-phenylindole

AO- Acridine orange

EtBr- Ethidium bromide

TMRM- tetramethyl rhodamine

PE- Petroleum ether

CHL- Chloroform

EA- Ethyl acetate

MET- Methanol

MMP- mitochondrial membrane potential

TG- thermogravimetric analysis

DSC- Differential scanning calorimetry

FTIR- Fourier-transform infrared spectroscopy

GC-MS – Gas Chromatography mass spectrometry

TLC- Thin layer Chromatography

NMR - Nuclear magnetic resonance

FA- Fatty acids

OA- Oleic acid

PA- Palmitic acid

BSA- Bovine serum albumin

HPLC- High performance liquid chromatography

PFF3- Purified fraction F3

PFF4- Purified fraction F4

Rf- Retardation Factor

MDC – Monodansylcadaverine

PI- Propidium Iodide

Akt- protein kinase B

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ABSTRACT

Bauhinia variegata Linn. commonly known as Kachnar or Mountain Ebony, is a plant that has been used in Ayurvedic medicines for centuries. Its use is well documented in ancient Ayurvedic texts such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. In Ayurveda, various parts of the Kachnar tree are used for different medicinal purposes. *Bauhinia variegata* has been found to have several pharmacological properties like anti-inflammatory, antioxidant, antidiabetic and hepatoprotective properties. Its active compounds are responsible for these pharmacological effects. One of the most commonly used formulations that contain Kachnar is Kachnar Guggulu, which is used for the treatment of arthritis, gout, and other joint-related problems. While Kachnar has a long history of traditional use in Ayurveda for its medicinal properties, there is currently no scientific evidence to support its effectiveness in treating lung cancer. Some preliminary studies show the anti-inflammatory properties of Kachnar and anti-cancer effect of crude extract on lymphoma. This study aims to investigate the potential anticancer effect of the phytocomponents found in the bark of *Bauhinia variegata* on lung cancer cell lines and aims to uncover the underlying biochemical mechanism involved in this process. The study analysed the phytochemical composition and antioxidant activity of *Bauhinia variegata* bark extracts. The results showed that the methanolic and water extracts had the highest antioxidant activity, as measured by DPPH radical scavenging. Furthermore, the study investigated the cytotoxic effects of the bark extracts on lung cancer cell lines. The Petroleum ether bark extract (PEBE) and Chloroform bark extract (CBE) were found to be most effective on A549 and H460 cells, respectively. Both PEBE and CBE induced apoptosis in the cancer cells through the activation of caspase-3 signalling cascade and mitochondrial cell death-mediated pathway. The isolation of phytocomponents of PEBE and CBE of *Bauhinia variegata* was done by column chromatography, followed by TLC and characterization of PEBE and CBE fractions was performed based upon GC/MS analysis. Oleic acid was found to be the most important factor with potent anticancer activity on A549 cells. Purified fraction F3 (PFF3) and Purified fraction F4 (PFF4) of CBE of *Bauhinia variegata* exhibited the most potent cytotoxic activity against H460 cells in a dose and time dependent manner. The synergistic anticancer effects of the combined treatment of PFF3 and Paclitaxel (PXT) on lung cancer cell lines (H460) is also elucidated. The study also found that treating A549 and H460 cells with specific phytocomponents of *Bauhinia variegata* increased ROS levels which could be the initiator of anticancer effect. Nuclear changes associated with apoptosis in both cell lines were studied using various dyes by fluorescent microscopy. The molecular pathways involved

in causing apoptosis were also explored by observing the changes in protein expression of apoptosis related proteins in lung cancer cell lines (A549 and H460).***The findings suggest the potential of these natural compounds in inducing programmed cell death in lung cancer cells, which could have implications for the development of new anti-cancer drugs.***