Herbal Drugs For Lung Cancer

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Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **"HERBAL DRUGS FOR LUNG CANCER"** is the bonafide

work of "**VINEET TIWARI."** who carried out the project work under my supervision.

Signature of the Dean of School   Signature of the Supervisor

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Approval Sheet

This thesis/dissertation/report entitled (Herbal Drugs for Lung Cancer) by (Vineet Tiwari) is approved for the degree of Bachelor of Pharmacy (Degree details).

Examiners

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1. Thesis title: HERBAL DRUGS FOR LUNG CANCER

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3. Project Supervisor was referred to for preparing the report.

4. Specifications regarding thesis format have been closelyfollowed.

5. The contents of the thesis have been organized based on theguidelines.

6. The report has been prepared without resorting toplagiarism.

7. All sources used have been citedappropriately.

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(Signature of the student)

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Introduction

1. Cancer

Cancer is a category of diseases in which the cells of the body tend to split uncontrollably and spread to the surrounding tissues. Frequency, the meiosis mechanism, and cell death all occur to keep the tissue in a healthy state.

Carcinogenesis is the act of doing a lot of things in a lot of different ways.

In the early stages of cancer, permanent cell modifications occur. The stages of aggressive and aggessive disease are included in the cell proliferation and progression phases.

A faulty cell can either stay in the tissue from which it was derived, which is known as a type of insulin cancer, or it can spread to surrounding tissues, which is known as a malignant form of insulin cancer. [1]

1.1 Types Of Cancer

There are over a dozen different forms of cancer that were discovered. Each cancer is categorized based on the type of cell that was initially involved. The below are the various forms of cancer:

-Carcinoma

-Uleukemia

-lymphoma and myeloma

-Nervous system cancer [2]

There are several forms of cancers, such as carcinomas, which include breast, kidney, lung, pancreas, and colon cancers, among others. [3]

2. Lung Cancer

Lung cancer, often referred to as lung carcinoma, is a debilitating lung disorder marked by unregulated lung tissue development. In the mechanism of metastasis, this development will extend across the lungs and into surrounding tissues or other areas of the body. The majority of primary lung cancers, also known as carcinomas, begin in the lungs. [4]
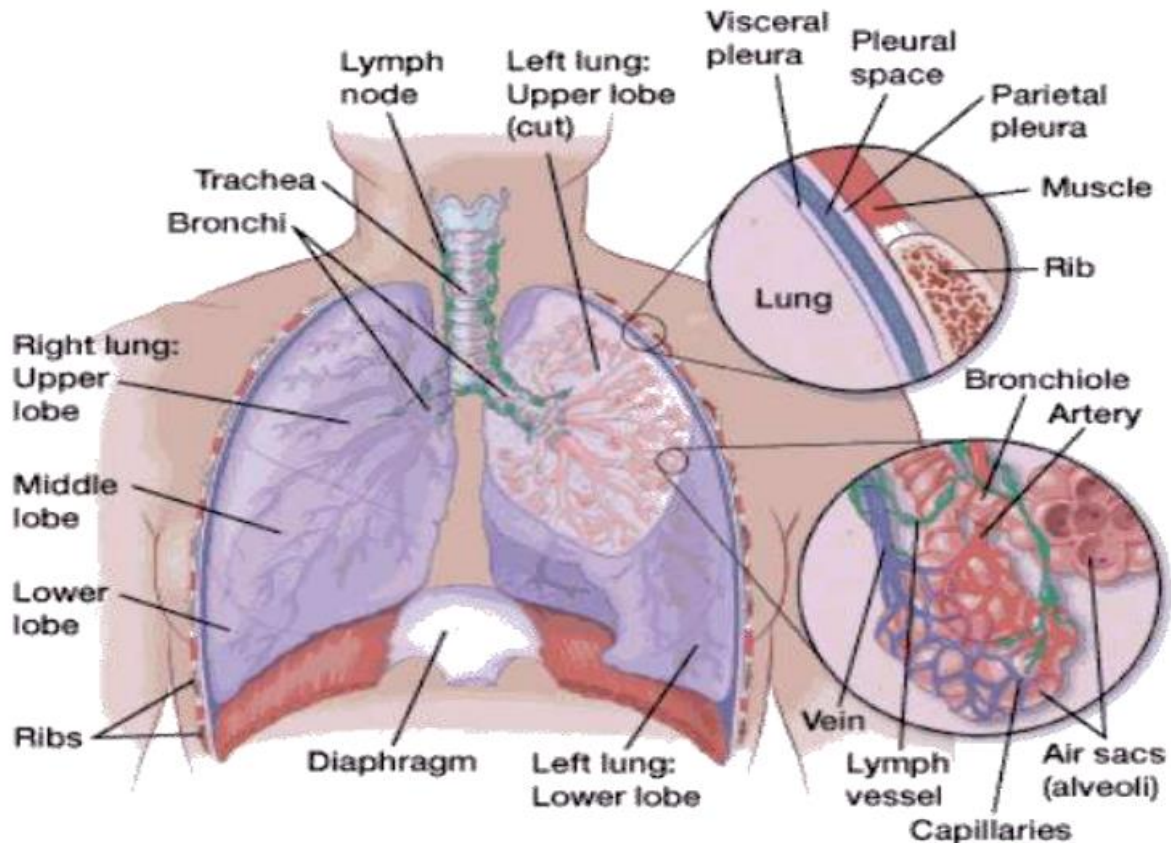
Fig 1: Lung Cancer

Lung cancer is the most common cause of death worldwide. Breast, prostate, and cervical cancer m ortality rates have improved, although lung cancer deaths have remained constant. [5]

Patients that arrive late have cancer that has either advanced to the region or has spread, resulting in a high mortality rate. Around 80% of lung cancer patients have stage III or IV disease at the time of diagnosis, and therefore do not qualify for curative therapy. [6]

A tumor's prognosis improves when it is detected early. Patients with lung cancer can (and sometim es do) go undiagnosed for years. Patients are not warned of apparent physical modifications and thi s is the first lung cancer to enter and be inserted into the abscesses. [7]

Longterm smoking is the leading cause of lung cancer (85%). Lung cancer can develop in people w ho have never smoked (10-
15 percent). Usually, a combination of genes and susceptibility to radon, asbestos, tobacco smoke, or other sources of air pollution causes these events. Chest radiographs and computed tomography (CT) scans will detect lung cancer. A biopsy, normally done by bronchoscopy or CT
direction, is used to validate the diagnosis. [8]

Cough, hemoptysis, chest and shoulder pain, dyspnoea, dizziness, weight loss, anorexia, fever, fatigue, and bone pain are all signs of lung cancer.

• Cough, bloody cough, chest pain, or shortness of breath are all respiratory conditions.

• Weight loss, fatigue, fever, or swollen nails are all systemic signs.

• Chest fatigue, bone pain, upper vena cava disruptions, or trouble swallowing due to the cancer's weight putting pressure on surrounding structures.

If the cancer spreads to the airways, it can obstruct the airway, making breathing difficult. Since prevention, there could be an aggregation of secretions, which may raise the chance of pneumonia.

Paraneoplastic disorders, which are signs that are not caused by the presence of local cancer, can attract the disease at first, depending on the type of tumour. Hypercalcemia, an antidiuretic hormone syndrome (SIADH, irregular urine, and polluted blood), ectopic ACTH production, and Lambert-Eaton myasthenic syndrome (autoimmune weakness due to autoimmunity) are all disorders that can occur in lung cancer. Pancoast tumors, which are highlevel lung tissue, may invade part of the sympathetic nervous system, causing Horner's syndrome (thinning of one eyelid and a small pupil on the other side) and brachial plexus injury. [9]

Many lung cancer signs (such as lack of appetite, weight loss, fever, and fatigue) are not well-defined. When certain patients have symptoms that need surgery, the cancer has already progressed past the original location. Weight loss, bone pain, and depressive symptoms are also signs that metastatic disease is present (headache, fainting, convulsions, or weakness of the leg). The skull, bone, adrenal glands, various lungs, liver, pericardium, and kidneys are all common sites of infection. At the time of diagnosis, about 10% of patients with lung cancer have no symptoms; these cancers are detected by normal chest radiography. [10]

Lung cancer has the highest death rate in the world, owing to the fact that it is mostly not diagnosed before the condition has progressed significantly, resulting in a substantial decrease in the patients' quality of life.

Aggressive smoking, secondhand smoke (smoking), Complementary and Alternative Medicine and cigarette smoking, exposure to internal and external air contamination, exposure to radiation, and occupational exposure to agents such as asbestos, nickel, chromium, and arsenic have all been reported as potential causes of lung cancer.

The most significant risk factor is smoke, and men are more likely than women to develop lung cancer.

A big prevention step is to avoid toxic contaminants such as smoking and air pollution. The type of cancer, stage (spread rate), and general health all influence treatment and long-

term outcomes. In certain cases, there is no cure. Surgery, chemotherapy, and radiotherapy are also common therapies. SCLC responds more to chemotherapy and radiotherapy than NSCLC, which is often treated surgically. [11]

Lung cancer struck 1.8 million people worldwide in 2012, killing 1.6 million people. As a result, it is a common cause of cancer-
related deaths in adults, and it is the second most common cause of cancer-
related deaths in women, after breast cancer. . [12]

2.1 Types of Lung Cancer

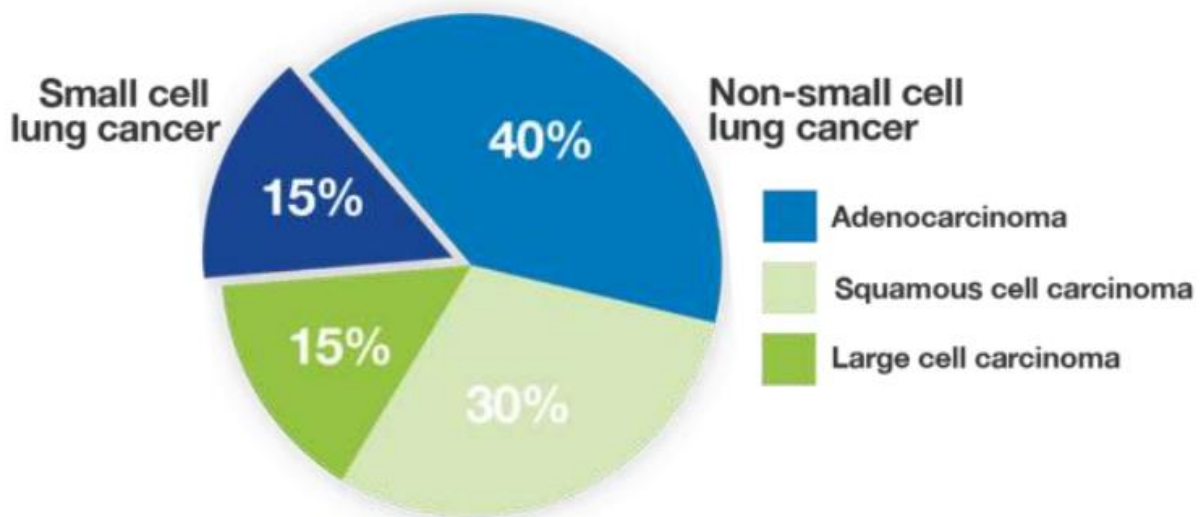It has been identified as a cancer of non-small cells and small cells in the past.

Fig 2

2.1.1 Small cell lung cancer:
Since the cells resemble oats under a microscope, small cell lung cancer is also known as "oat-cell cancer." It normally begins in the bronchi and then travels quickly to other areas of the body, including the lymph nodes. Smoking is the most common cause of this disease, accounting for less than 20% of all cases.

Small cell lung cancer is classified into two categories, which are named after the cell types present in the cancer and how the cells appear under a microscope:

• Small mixed cell carcinoma • Small cell carcinoma (oat-cell cancer)

2.1.2 Non-small cell cancer

Lung cancer is a form of cancer that affects the lungs. It's extremely popular. It accounts for about nine out of ten cases and grows at a slower pace than SCLC. It usually develops slowly and causes little to no signs until it reaches a certain size.

Non-small cell lung cancer is divided into three types:

• **Lung adenocarcinoma**: Lung adenocarcinoma is the most prevalent form of lung cancer, accounting for 30% of all cases and about 40% of non-
small cell lung cancer cases. Many prominent cancers, such as breast, prostate, and colorectal cancer, include it. Lung adenocarcinomas are present in the glands that contain mucus which help us breathe in the outer part of the lungs. Cough, shock, weight loss, and fatigue are some of the symptoms.

• **Squamous cell**: This form of lung cancer develops in the centre of the lungs, where the big bronchi connect the trachea to the lungs or either of the airway's large branches. Squamous cell lung cancer makes up about a third of all non-small cell lung cancer cases, and it's often attributed to smoke.

• **Undifferentiated large cell carcinoma**: A different type of lung cancer develops and spreads quickly and can be located everywhere in the lungs. This form of lung cancer accounts for 10 to 15% of all NSCLC cases. Carcinoma of large isolated cells grows and expands quickly in many cases.

[13]

3. Herbal Treatments and Drugs for Lung Cancer

Alternative and over-the-
counter ways of using herbal or animal extracts as proven medicines or health-
promoting agents are referred to as phytomedicine or phytotherapy.

3.1 Drugs

1. **Vinca alkaloids**, is the second most often used agent in the pharmacy and one of the oldest and most frequently used agents for cancer care. Vincristine and vinblastine are the two main alkaloids. Patients of lung cancer and other tumours are given these alkaloids, which are isolated from the Catharanthus roseus (Apocynaceae) plant. These agents work by binding to tubulin and disrupting the activity of microtubules, including those with mitotic spinal cords, by binding metaphase to the cell cycle.
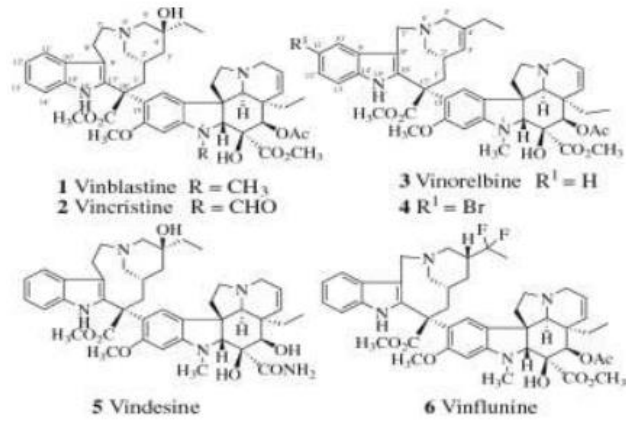
1 Vinblastine R = CH₃
2 Vincristine R = CHO

3 Vinorelbine R¹ = H
4 R¹ = Br

5 Vindesine

6 Vinflunine

Fig 3

Fig 4

(6)

2. **Paclitaxel (Taxol) taxis**, Patients with lung cancer should take Taxus brevifolia extracts, which are derived from the Pacific tree Taxus brevifolia. This substance binds to microtubules and facilitates tubulin polymerization, resulting in microtubule strengthening, cell cycle circulation, and malignant mitosis. [14]

Fig 5

3. **Astragalus polysaccharide**, has antitumor activity in human lung cancer cells A549 and NCI-H358; NF-B inhibition can be linked to antitumor activity. [15]

Fig 6

4. **Etoposide**, is derived from podophyllotoxin, a semisynthetic compound occurring naturally in the mandrake plant. This epipodophyllotoxin, also known as VP-16, is used to treat NSCLC and other cancers. [16]

Fig 7

5. **Nan Sha Shen**, also known as American silvertop root, is an antibiotic that helps to prevent lung cancer. It is cultivated in the spring and autumn in several regions of Southern China. It can reach a height of 30cm in cold climates. This herb's medicinal aspect is a wonderful root that has many health benefits. The root of the plant is used to alleviate the effects of lung cancer. It can also be used in conjunction with bei sha shen to aid cancer recovery. [17]

Fig 8

6. In **Oldenlandiadiffusa**, Oral administration of herbal extracts considerably reduced B16-F10 cell growth in C57Bl / j mice's lungs, resulting in a 70% decrease in lung metastases (p0.001). The release of Oldenlandiadiffusa successfully blocked the development of all eight cancer cells and increased apoptosis significantly. On average pancreatic cells, exhaust has a minor toxic effect. Furthermore, pulmonary lung metastases were significantly inhibited in animal models with no noticeable side effects. Herbal extracts may have anticancer properties. [18]

Fig 9

7. **Phyllanthus emblica**, Antioxidants are polyphenols and hydrolysable tannin derivatives. Ellagic acid, gallic acid, and chebulagic acid are three well-studied examples. In reaction to carcinogens and active oxygen species, these and other tannins from Phyllanthus emblica have been shown to inhibit mutagenesis and lipid peroxidation. It's likely that the combination of these cooperative compounds causes Amla to unleash free radicals and produce cancer-fighting substances by certain interactions. [19]

Fig 10

8. **Taxi operators**, However, they function by interfering with the behaviour of microtubules. Tax payers inhibit the depolymerization of microtubules, or cell proliferation, by preventing mitosis in metaphase and anaphase, which leads to apoptosis. They are thought to be the most powerful anti-tumor agent. Given the harmful results and poor melting in water, taxis are the first option medications for the treatment of lung and other metastatic lungs, according to several clinical trials and laboratory research. [20]

Fig 11

9. **Platycodon grandiflorum**, The study described and tested nine major bioactive substances, including platycodin D, which contains 47 compounds in PG, including triterpenoid saponins, steroidal saponins, and flavonoids. Data was gathered in terms of data mining. There are 545 drug-related targets and 2,664 disease-related goals. The topological study revealed 20 primary targets, including caspase 3 (CASP3) and prostaglandin-endoperoxide synthase 2 (PTGS2), implying that the MAPK signalling method and P13K-AKT could be involved in LC therapy. The results of cell advent have shown that vital nutrient bonding can be very beneficial. [21]

Fig 12

10. **The bark of the roots of Marus alba L. (MA),** In Korea, it has long been used to treat a variety of lung diseases. While recent research has shown that MA has anti-cancer properties in a variety of cancer cells, it is still unknown if MA inhibits lung cancer cells' ability to migrate. The current research looked into the impact of MA on lung cancer cell migration and how successful it was. The release of MA methylene chloride (MEMA) blocked the migration and invasion of H1299, H460, and A549 lung cancer cells (NSCLC) by a comparatively young individual in target, according to results from the transwell trial and the assay-healing assay. MEMA decreased the phosphorylation of STAT3 and Src, according to Western blot study. MEMA has removed the expression of epithelial-mesenchymal transformation (EMT) markers such as Slug, Snail, Vimentin, and N-cadherin, as well as Occludin, a protein-junction protein. When phospho-mimetic STAT3 (Y705D) or Src (Y527F) was transferred to H1299 cells, the control of EMT mark

ers and decreased migration caused by MEMA treatment were reversed. Finally, MEMA inhibited the migration function of human NSCLC cells by inhibiting Src/STAT3-mediated EMT. [22]

Fig 13

11. **Rhus verniciflua**, The benefits of systemic chemotherapy for progressive and advanced cell lung cancer (NSCLC) are modest but potentially toxic. Lacquer tree Rhus verniciflua Stokes (RVS) is an old herbal medicine used to treat cancer. We looked into the effectiveness and safety of RVS-derived allergen (aRVS) for extending life in NSCLC patients who had failed first-line or second-line chemotherapy. . [23]

Fig 14

12. **Brassica nigra, (black mustard seed)**is common in a number of Asian and African countries. Mustard seeds have previously been found to have potent anti-
cancer properties against a variety of cancers. We studied different cell and cellular pathways of the anti-cancer effects of ethanolic release of B.nigra cells against non-
cellular cancer cell lines A549 and H1299 in this study. B. Released nigra inhibited A549 and H1299 clonogenic cells' effectiveness and survival in a clustered manner, indicating that it inhibited their development. As shown by the rise in caspase-
3 activity, B. nigra produced in the form of time and concentration as a result of cell apoptosis. [24]

Fig 15

TABLE

S.No.	Herbal Drugs	Biological Name	Chemical Constituents	Use in NSCLC	Use in SCLC
1	Vinca Alkaloids	Vinca Rosea	Two basic multiringed units, an indole nucleus (catharanthine), and a dihydroindole nucleus (vindoline), joined together with other complex systems.	Yes	Yes
2	Taxanes Paclitaxel (Taxol),	Taxanes	Chemical structure consist of taxane ring with a four-membered oxetane side ring at positions C4 and C5 and an active homochiral ester side chain at C13 that binds to microtubules in a guanosine triphosphate (GTP) independent manner to induce cytotoxicity activity.	Yes	No
3	Astragalus polysaccharide	Astragalus	Main chain contains linked α-(1→4) glucose residues. Monosaccharide composition analysis of an APS sample by HPLC revealed that it was composed of rhamnose, glucose, galacturonic acid, and arabinose.	Yes	Yes
4	Etoposide	Podophyllotoxin with a D-glucose derivative.	It is a beta-D-glucoside, a furonaphthodioxole and an organic heterotetracyclic compound. It has a role as an antineoplastic agent and a DNA synthesis inhibitor. It derives from a podophyllotoxin and a 4'-demethylepipodophyllotoxin.	Yes	Yes
5	Nan Sha Shen	Adenophora triphylla	n-Hexadecanoic acid (29.14%), 9,12-octadecadienoic acid (Z,Z)- (17.22%), hexadecanoic acid, methyl ester(8.98%), 9-octadecenoic acid, methyl ester, (E)- (7.03%) , 9,12-octadecadienoic acid (Z,Z)-	Yes	No

			, methyl ester (5.93%), phytol (5.50%), and estradiol (4.43%) were measured as the major compound.		
6	Oldenlandiadi ffusa	Hedyotisdiffus a	Cyclopentane Monoterpenes. Glucosides. Iridoids. Lignans. Pyrans. diffusoside B. geniposide. gardenoside	Yes	No
7	Phyllanthus e mblica	Emblica officin alis Gaertn	Chebulagic acid. Geraniin. Chebulinnic acid. Corilagin.	Yes	No
8	Taxans	Taxane	Taxanes are composed of a fo ur- member oxetan ring attached at C4- C5 position and an ester side c hain attached at C13.	Yes	Yes
9	Platycodon gr andiflorum	Platycodon gra ndiflorum	It contains a large number of f atty acids such as linoleic acid (up to 63.24%), a variety of a mino acids, vitamins, and mul tiple essential trace elements.	Yes	Yes
10	Morus alba	White mulberr y	Flavane derivative, (2S)-4′-hydroxy-7-methoxy-8-prenylflavan (1), together wit h twelve known compounds in cluding three flavanes (2–4), three chalcones (5–7), two flavones (8–9), two benzofurans (10–11) and two coumarin (12–13)	Yes	No
11	Rhus vernicifl ua	Japanese lacqu er tree	Gallic acid, fustin, fisetin, que rcetin, butein, and sulfuretin are the main active constituen ts of R. verniciflua	Yes	No
12	Brassica nigra	Black Mustard	Include polyphenols, phenolic acids, flavonoids, carotenoids (zeaxanthin, lutein, β-carotene), alkaloids, tannins, saponins, anthocyanins, phyt	Yes	Yes

osterols chlorophyll, glucosinolates, phytosteroids, terpenoids, glycosides.

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