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Review on: Anticancer Activity of Plectranthus Amboinicus

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ABSTRACT :-

Today's most common and potentially fatal disease is cancer, which is on the rise due to our changing lifestyle. Chemotherapy and other drugs cause various side effects in a healthy body. It is crucial to discover new cancer treatments from nature. The chemical manufacturing process used to make many of the drugs on the market can have unfavorable effects. The anticancer properties of various plant materials, including as leaves, bark, roots, etc., have been the subject of several studies. For instance, leaves of Plectranthus amblycinicum. Flavonoids found in plectranthus ambonicus leaf ethanolic extract exhibit remarkably strong anticancer properties against breast, liver, and oral cancer (KB) cells, among other cancer types.The plant has been shown to have antimicrobial, antifungal, anti-inflammatory, and anticancer properties. These effects are attributed to the presence of secondary metabolites and important constituents, including tannins, flavonoids, glycosides, phenols, and steroids, which have been identified using a variety of spectroscopic techniques. The plant's various sections have been utilized to make medications. This plant contains a number of significant components that make it suitable for use as medicine without causing adverse effects.

KEYWORDS:- Plectranthus Amboinicus, Oral Cancer, Bioactivities Of Plectranthus Amboinicus.

INTRODUCTION:-

Heart and cardiovascular disorders are among the leading causes of death in developed nations, along with cancer. Since ancient times, medicinal plants have been used to treat a wide range of illnesses in both humans and animals. In Indian Ayurveda, they play a major role as a substitute for manufactured medicine.[1] According to an in silico study, the steroid B-sitosterol, derived from plectranthus amboinicus (Lour.) Spreng., has the ability to suppress the proliferation of cancer cells, specifically T47D, MCF-7, HeLa, and WiDr cell lines. The inhibitions occurred through PI3K, EGFR, ER– a, ER--B.dan HER-2 pathways.[2]To extract therapeutic candidates from natural product sources in an efficient manner, careful plant selection, extraction procedures, and screening strategies focused on finding bioactive compounds are required. This plant's leaves have been used to cure a number of illnesses, such as bronchitis, malerial fever, hepatopathy, renal and vesical calculi, cough, and chronic asthama.[3]

Patta ajwain

Fig 1 :- plectranthus Amboinicus

Biological name:- Coleus Amboinicus

Biological source:- Amboina, Moluccas

Family:- Lamiaceae (Mint family)

Appearance:- Large, fleshy stems, thick leaves, suborbicular in shape, flowers are pale purplish in color, strong, pleasant fragrance.

Chemical constituents:-

The aqueous leaf extracts of plectranthus Amboinicus contain polyphenols such as rosmarinic acid, rutin, caffeic acid, gallic acid, p - coumaric acid and quercetin.

Other compounds:-

Tannins, flavonoids, saponins, polyuronides and Steroid glycosides.

Uses:-

Medicinal uses:-

The leaves have been used in traditional medicine to treat a variety of conditions, including :

Respiratory disorders like asthma and cough.

Digestive diseases like dyspepsia, dysentery, diarrhea, and colitis.

Inflammatory diseases or swelling symptoms.

Rheumatoid arthritis.

Antimicrobial :

The leaves have been shown to inhibit the growth of pathogens.

Anti - inflammatory :-

The leaves have been shown to have anti-inflammatory activity.

Prebiotic :-

The leaves have a prebiotic effect on the prebiotic bacteria Lactobacillus Plantarum.

ORAL CANCER :-

Oral cancer (OCC) is categorized with upper aerodigestive tract malignancies based on similar epidermilogical features.

Risk factors:-

More than 50% of pre-malignant lesions possess a mutation of the P53 tumor suppressor gene. Eighty to ninety percent of all growth factor receptors (EGF-R) are expressed in head and neck malignancies.[4]

1] Tobacco and Alcohol:-

Tobacco comes in all forms and is carcinogenic. Eighty to ninety percent of OCC patients smoke, and the percentage rises with the quantity and duration of tobacco use.[5] Tobacco also contains nitrosamines and polycyclic hydrocarbons, which are irritating substances and carcinogens that alter host DNA and eventually cause oral cancer.[6] Tobacco and alcohol work in concert to increase the risk of mouth cancer. Regretfully, tobacco and alcohol use are rising quickly throughout Africa.[7]

2] Viruses:-

OCC may occur as a result of several sexual partners because of Hapav.

3] Oral hygiene:-

Because bacteria in the mouth cause an increase in acetaldehyde when alcohol is broken down, poor dental hygiene contributes to the development of oral malignancies.[8]

4] Nutritional factors:-

Because meat and salted and smoked fish contain nitrosamines, which are carcinogenic, eating a diet high in these foods raises the risk of acquiring OCCs.[9]

Fig 2 :- Oral Cancer Symptoms

Inflammation and Oral Cancer:-

The primary characteristic of cancer is inflammation. Inflammatory processes are the cause of about 15% of malignancies. Eighty percent of UADT tumors and possibly malignant lesions have overexpressed COX-2, and this overexpression is linked to lymphatic metastasis.[10]

Biopsia:-

Since other methods have drawbacks like false positives, a lack of structural analysis, and superficial samples, the diagnostic reference examination is still the clinical examination of the oral cavity reinforced by biopsy and followed by histological investigation.[11]

Biomarkers:-

It is easier to diagnose malignancies early when biomarkers from biological fluids (blood, urine, and saliva) are used. It has been suggested that salivary biomarkers play a significant role in the detection and evaluation of OCCs and other possibly cancerous lesions.[12] A genetic profile of the patient's tumor is obtained using the method known as "liquid biopsies," which involves finding circulating tumor DNA in blood samples. These liquid biopsies may eventually offer an alternative to biopsying the actual tumor tissue for the purpose of early cancer detection.[13]

Survival and prevention:-

Despite advancements in treatment, the five-year survival rate for OCC remains at 40% for cases detected at advanced stages III and IV and 80% for cases diagnosed at early stages I and II.[15]

Oral Cancer Treatment:-

There are various treatment plans for oral cancer that vary according on the TNM stage, patient age, and kind of cancer.Both chemotherapy and radiation therapy have drawbacks in terms of severe toxicities or treatment resistance, which all lower patients' quality of life and general health.[14]

PLECTRANTHUS AMBOINICUS :-

Botanical Description:-

1] Taxonomy:-

Plectranthus amboinicus sprengel is a member of the family Laminaceae or mint family. It consists of over 300 species of succulent herbs and subshrubs that can be annual or perennial.[16]

2] Morphological features:-

This huge, sprawling succulent herb has a strong scent and is meaty. The fleshy stems develop to a length of 30 to 90 cm, and are either tomentose (heavily coated in pubescent, soft, short, and upright hairs) or have long, inflexible hairs (hispidly villous). This leaf has a sweet, aromatic flavor and a pleasant, reviving scent. With a short tube, enlarged throat, and small lips, the corolla is five times longer than the calyx and has a pale violet color.[17]

Phytochemistry:-

Non-volatile chemical constituents:-

Phenolic acids, flavonoids, monoterpene hydrocarbons, sesquiterpene hydrocarbons, oxygenated monoterpenes, and ester were among these non-volatile chemical components. The non-volatile components in the chloroform extract of air-dried plectranthus amboinicus leaves were fractionated using the silica gel column chromatography technique.[18]

Bioactivities of Plectranthus Amboinicus:-

1] Antimicrobial activity:-

Due to its chemical diversity, Plectranthus amboinicus extract, from crude extract to an essential oil, contains a multitude of biological constituents. Plant phytochemicals have antimicrobial activity against a broad spectrum of bacteria, yeast, and mold, but their quantity and quality vary according to the bioactive constituents.[19]

2] Antibacterial activity:-

The growth of Salmonella typhimurium and Escherichia coli was inhibited by a hot water extract of plectranthus amboinicus leaves, whereas Lactobacillus plantarum was stimulated. Antibiotic-resistant bacteria are currently receiving a lot of attention since they are progressively becoming a big issue in the medical field. When mixed with aminoglycosides, plectranthus amboinicus essential oil is said to have a synergistic effect on the antibiotic's toxicity towards resistant bacterial strains. This suggests that the essential oil of plectranthus amblycinicus may be a natural source of a substance that modifies bacterial resistance.[20]

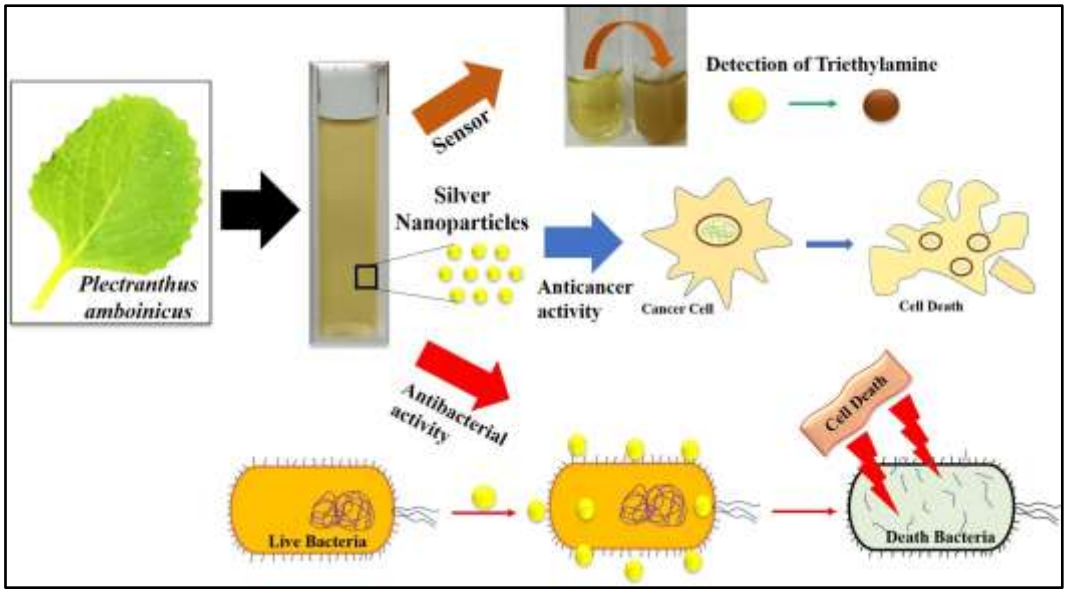

Fig 3 :- Antibacterial activity

3] Antifungal activity:-

Numerous studies have also demonstrated the critical role plectranthus amboinicus plays in preventing the formation of fungi that cause disease. The assessment of the impact of plectranthus amboinicus essential oil on the anti-candida efficacy of certain antifungals used in clinical settings revealed varying degrees of interference. Conversely, amphotericin B exhibited a minor disruption in its anti-yeast efficacy.[21]

4] Antiviral activity:-

These include a few from plant sources such as gossypol derivatives, praneem polyherbal preparations and plantibodies. In a similar vein, plectranthus amboinicus extracts were found to exhibit both anti-HIV inhibitory efficacy and antiviral activity against Herpes Simplex Virus-1 (HSV1).[22]

5] Respiratory Disorder:-

To manage asthma, leaves are also used to make a decoction or juice that is administered orally together with other herbs. This infusion also relieves the excessive accumulation of thick mucus or phlegm in a bodily cavity or airway, which is why it is used to treat catarrhal infections.[23]

6] Antiepileptic activity:-

Significant anticonvulsant activity was observed in both models, with the maximum activity being recorded by the alcoholic leaf extract. Additionally, they hypothesized that this activity might be caused by the alkaloids, flavonoids, and saponins present in these extracts.

7] Antitumorigenic activity:-

The growth of the sarcoma-180 tumor was significantly inhibited in mice treated with plectranthus amboinicus hexane extracts, according to the data. This was similar to the cancer treatment medication metrotexat, which completely stops tumor development but has extremely dangerous side effects. The ethanolic extract of Peltronichus amblycinis shown notable anticancer efficacy by inducing apoptosis in the human lung cancer cell line A549.[24]

8] Lactogenic activity:-

Eating leaves considerably raises the amount of iron, potassium, zinc, and magnesium in milk, which benefits the overall weight and health of the baby.[25]

9] Antioxidant activity:-

Due to the presence of phytochemical components as carvocrol and thymol, plectranthus amboinicus essential oil has a notable antioxidant effect against stress caused in lung cancer cell line-induced models, both in vitro and in vivo. Using plectranthus amblycinicus essential oil is less expensive thanusing natural medication formulations, and there have also been no documented adverse effects on animal models.[26]

MECHANISM OF ACTION:-

1] The cytotoxic activity of the plectranthus amboinicus (Lour.) Spreng. extract was observed against the HeLa cell line.[27]

2]To find cytotoxic substances from plectranthus amboinicus (Lour.) Spreng. against human breast cancer MCF-7 cells, a study using HPLC-based metabolomics was carried out.[28]

3]According to the findings of the anticancer investigation, plectranthus amboinicus leaf methanol extract showed significant dose-dependent cytotoxicity and outstanding anticancer effectiveness against the tested cell line, specifically DLA (Dalton's Lymphoma Ascites).

4]Applying the chosen plant extract to the investigated cell demonstrated possible anticancer action. Have constantly shown its efficacy, especially with regard to oral carcinomas.

5] The plant extract in methanol at a concentration of 200 micrograms proved highly efficient, resulting in a 30.4% cell death rate. It was shown that plectranthus amboinicus has an IC50 value of 53 micrograms per milliliter against oral cancer cells.[29]

6]The leaves of Plecotranthus amboinicus are extracted ethanolically, and this yields flavonoid chemicals with remarkably strong antioxidant and anticancer properties.[30]

CONCLUSION:-

The given plant plectranthus amboinicus shows good effectivity against oral cancer which includes flavonoids, tannins, saponins and steroid glycosides with their antimicrobial activity, antibacterial activity, antifungal activity, antiviral activity and antitumorigenic activity.The information provided in this study will be crucial in the development of novel, pharmaceutically significant anti-cancer medications derived from plectranthus amboinicus. the methanol extract's enhanced antioxidant activity due to the persistent presence of phytochemicals. The plant extract displayed efficiency against DLA-induced solid tumors and EAC-induced ascites tumors. This discovery may be utilized to develop effective therapeutic approaches for the prevention or treatment of various types of cancer in human beings.

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