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A Comprehensive Review on Phytochemical Evaluation and Pharmacological Activity of Acacia Farnesiana

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ABSTRACT:
The aim of the reviewis to highlight the pharmacological activity of Acacia farnesiana.Acacia farnesiana is one of the species of acacia genus.Acacia farnesiana is used in traditional medicine in Mexico to treat dysentery and tuberculosis, it may contain bioactive chemicals that help to explain its use.In addition,the review includes phytochemical evaluation.The chemical constituentspresent in Acacia farnesiana are alkaloids, tannins,saponins,flavonoids,steroids,glycosides,proteins.Acacia farnesiana has several medicinal uses. The activity of Acacia farnesiana are anti-oxidant,anti-inflammatory,anti-diabetes,anti-proliferative,anti-microbial,anti-hypertensive,anti-anthelmintic,anti-ulcer .

KEYWORDS: Acacia farnesiana, Pharmacological activity,Natural gums,Phytochemical evaluation, Therapeutic uses.

I. INTRODUCION

The family Mimosaceae includes the genus Acacia. A fairly wide genus called Acacia wild include trees, shrubs, and climbers. The Indian Subcontinent, tropical Africa, Burma, Sri Lanka, Saudi Arabia, Egypt, and West and East Sudan are all home to this native species. In India, the states of Maharashtra, Gujarat, Andhra Pradesh, Rajasthan, Haryana, and Karnataka typically have natural babul forests. With the exception of the states in the northeast, Kashmir, and Kerala, dispersed trees in groups occur naturally and are widely planted in practically all of the states and union territories. There are thought to be over 1380 different species of acacia in the globe, about two-thirds of which are indigenous to Australia and the rest of which are found in tropical and subtropical areas.(Fig 1)

Different nations employ plants as medicine, and they are the source of a number of strong and dangerous medications. There have been claims made about a number of Acacia species having traditional therapeutic properties.Different plant sections have various phytochemical compositions and pharmacological effects.

There are more than 1500 species in the globe, 1200 of which are exclusive to Australia.Many of them have been used for various illness conditions in the past. Indian traditional healers have employed numerous kinds of Acacia to treat a variety of illnesses. One of the best sources of bioactive flavonoids, alkaloids, phenolics, saponins, polysaccharides, tannins, and terpenoids is the acacia species. There are several Acacia species, but only a small number of them have therapeutic value. The most notable ones are:

1. Acacia polycantha
2. Acacia catechu
3. Acacia Leucophala
4. Acacia ferruginea
5. Acacia leucophloea
6. Acacia nilotica
7. Acacia farnesiana
8. Acacia sinuata

Important multipurpose tree that has been widely used to cure a variety of illnesses, such as colds, bronchitis, and diabetes.The most important genus in the Leguminosae family, first described by Linnaeus in 1773, is Acacia. About two-thirds of the 1380 species of Acacia native to the planet are found in Australia, and the other species are distributed throughout tropical and subtropical areas of the globe .In his book "Flora of Madras Presidency," Gamble (1918), listed more than 40 species of this genus as existing in India.

In India, acacia species are frequently referred to as "Babool," and they have long been used ethnomedicinally to cure issues with the skin, sex, stomach, and teeth. Acacia arabica (Lam.) Wild. (Mimosaceae) is also known as acacia nilotica. Arabic tree, also known as babul, kikar, or Indian gum, is widely acknowledged as a useful tree. It can be found all over the world in arid and semi-arid regions. Acacia arabica has been shown to be a helpful cure for toothaches, sore throats, and malaria (bark). The anti-fertility properties of A. arabica nuts and pods have been studied.

A. arabica pod methanolic extracts have been reported to be effective against HIV-PR. A. nilotica ethyl acetate extract has been investigated for antiplasmodial efficacy against various Plasmodium falciparum strains that are sensitive and resistant to chloroquine. This species fresh plant parts have reportedly been shown to have the strongest anti-Hepatitis C viruseffects. These effects include diarrhoea, dysentery, biliousness, bleeding piles, and leucoderma.

Fig 1;Acaciafarnesiana L. plant

A medicinal plant called Acacia farnesiana thrives in the tropical regions of the Indian subcontinent, particularly in the sandy soils of river beds in Northern India and some regions of Tamil Nadu.Thorny bush or small tree, up to 8 meters tall; light brown, rough bark; practically glabrous branches, purplish to grey, with tiny glands; spinescent stipules, normally short, up to 1.8 cm long, rarely longer, seldom inflated; pinnae 2-8 pairs, leaflets 10-12 pairs, minute, 2-7 mm long, 0.75-1.75 mm wide, glabrous, leathery; flowers in axillary pedunculate heads. The pod is indehiscent, straight or curved, 4-7.5 cm long, roughly 1.5 cm wide, subterete and turgid; the leaves are twice pinnate; and it has a small gland on the petio that is dark brown to blackish, glabrous, slightly longitudinally striate, and pointed at both ends. The calyx and the corolla are both perfumed. Chestnut-brown, two-rowed seeds that are 7-8 mm long, about 5.5 mm wide, elliptical in shape, thick, and only very slightly compressed, are enclosed in a dry, spongy tissue.Other names for it include sweet acacia, mimosa shrub, and cassieflower.

Acacia farnesiana Wild, common names for this plant include needle bush and sweet acacia; it is a tiny, branching, deciduous tree or shrub of the Leguminoseae family. Other common names for it include Guyababla and Belati Babul. Although the plant's native area is unknown, tropical and subtropical climates are where it is most prevalent. The parts of the tree that are most frequently utilized in traditional medicine are the bark and the blossoms. Stomachaches can be relieved with flowers. Pods from A. farnesiana are used to cure conjunctivitis and sore throats. This plant bark is employed as an astringent and demulcent. In Colombia, A. farnesiana is used to cure malaria, and studies on animal models have revealed some efficiency of the bark and leaf extract against the malarial parasite Plasmodium falciparum.Malaria is treated by inhaling crush and boil the bark and leaves. According to reports, leaf powder has therapeutic properties. A. farnesiana root is used for diarrhoea and rheumatism as well as antispasmodic, aphrodisiac, astringent, demulcent, febrifuge, and stimulant. To relieve sore throat discomfort, chew on the gummy root.

At a dose of 25 mg/kg, an active fraction from an aqueous extract of A. farnesiana demonstrated encouraging anti-diabetic efficacy. In both the carrageenan-induced paw oedema for acute inflammation and the cotton pellet-induced granulation for chronic inflammation models, the ethanol extract significantly reduced inflammation. A. farnesiana seeds have been used to isolate a lectin-like agglutin that has been discovered to have anti-inflammatory properties.Different protein fractions that were extracted from the seeds were found to have notable anti-inflammatory and analgesic properties.Alkaloids, saponins, carotenoids, flavonoids, and terpenoids, among other substances, have been extracted from seeds and pods. Eight flavonoids, three recognized diterpenes, two triterpenes, and four new diterpenes-acasiane A, acasiane B, farnesirane A, and farnesirane B- were also extracted from the root.

Some of the extracted compounds demonstrated moderate antioxidant and anti-inflammatory activity as well as promising cytotoxicity against human cancer cell lines.The bark of A. farnesiana, which grows in Bangladesh, as well as its organic and aqueous soluble fractions, were examined as part of our ongoing research on medicinal plants of Bangladesh.

Synonyms: Acacia acicularis Wild., Acacia densiflora (Small) Cory, Acacia ferox M.Martens & Galeotti, Acacia indica (Poir.) Desv.,Acacia lenticellata F.Muell., Acacia minuta (M.E.Jones) R.M.Beauch., Acacia pedunculata Willd., Acacia smallii Isely,Farnesia odora Gasp., Farnesiana odora Gasp., Mimosa acicularis Poir., Mimosa farnesiana L., Mimosa indica Poir,Mimosa suaveolens Salisb., Pithecellobium acuminatum M.E.Jones,Pithecellobium minutum M.E.Jones, Poponaxfarnesiana (L.) Raf. Vachellia densiflora Small, Vachelia farnesiana (L.)Wight & Arn.

Regional names: English-Cassie,cassie flower,cassy,dead finish,ellington curse,farnese wattle,fragrant acacia,huisache,needle bush,north west curare,mimosa bush,prickly mimosa bush ,sweet acacia,sweet wattle,sponge wattle,sponge tree,sheep's briar,prickly moses,scented wattle,thorny feather –wattle,wild briar
India-Barangay daru,bubble,bubbla,arivelam,arimaedah,arimeda,hirjua araung,girimeda,ganthelobabul,gantdari,devbabul,irimeda,jait,kadam kapoor,kapur,tarua kadam,kasturi tuma, marudruma, nangnuk kyeng,vetumul, vetuvali,vilaiti babul,wilayatikikar
China-Ya zo shu pi
Malaysia-Bunga siam,lakshana, pok ok laksana,pokok lasana
Thailand-Khamtai,krathin-hom,krathin-thet
Indonesia-Bunga bandara,bunga mestu,sarikonta,bunga metu,kembang jetun
Philippines-Aroma,kamban,kambang,kandaroma
Nigeria-Boni,ewo-bomi,opoponax
Argentina-Aranas,cassie,tusca,subin,espinillo,aroma,churqui,kuntich,espino blanco,esponja,espojeira,cachito de aroma.
Madagascar-Dintringahy, hatika,ramiarimbony, roycassy,roy-vazaha
Myanmar-Nan-lon-kyaing
Japan-Kin-gokan(golden Albizialebbeck)

Geographical distribution:The closest relatives of Acacia farnesiana can also be found in northern tropical America, where it is believed to have originated.It is the most widely dispersed species of Acacia, having been brought to all tropical and subtropical areas ofthe world for its fragrant blossoms. It has since become widely naturalized and occasionally weedy, as in the southern United States and Australia, for example. The Spaniards brought Malesia from Mexico to the Philippines initially. It is currently documented all over South-East Asia. It was originally grown in Europe in the Hortus Farnesianus in Italy in 1611, and Southern France now relies heavily on it as a crop.

Botanical description: Leguminosae is the family that includes A. farnesiana. It is a tiny tree up to 4(-10) m tall or a branch-laden shrub. The bark is light brown and coarse. The branchlets have noticeable lenticels and are cylindrical, hairless, greyish-brown to purplish-grey in color. The lateral shoots, peduncles, and leaves are oriented alternately and frequently develop from little spurs on older wood.The leaflet is placed twice along a common axis in pairs, one pair on each side. The sharp-pointed, straight, up to 5 cm long whitish-grey stipules. A circular, sessile, and frequently raised gland is present in the distal half of the 0.5–1.3 cm long petiole. While the apex is asymmetrically acute and suddenly ends in a small stiff point, the base is truncate. The major vein is not in the center, and the lateral veins beneath are elevated and noticeable. Both surfaces are hairless.

The inflorescence consists of a spherical stalk with 50–60 flower heads grouped in groups of 1–7 blooms at the top leaf axils. The stalk measures between 0.8 and 3.5 cm in length, and the flowers cover the involucel, a ring of bracts at the top. The blooms are sessile, fragrant, golden-yellow, and have five parts in a floral whorl. The sepal is triangular, sharp, and hairless except for the outside of the apex. It has five 0.2 mm long teeth and is 1-1.3 mm in diameter. The tube is hairless and the petal is 2.3–2.5 mm long.There are five elliptical, 0.5 mm long lobes. The apex is barely covered in short, silky hairs and is sharp.

Numerous, 4-5.5 mm long stamens with glandless anthers are present. A little 1.5mm long stalk that is heavily covered in short, silky hairs serves as the ovary's support structure. The fruit is a turgid, dark brown to black, firmly papery, hairless, and indehiscent cylindrical pod that is 4-7.5 cm × 1-2 cm in size and has a small slant to it (sometimes). Obliquely longitudinal veins with some reticulate vein cross connections. The seeds are ellipsoidal, 2-rowd, obliquely transverse, and 7-8 mm x 4-5.5 mm in size. They are encased in a delicious pulp. Olive-brown to olive-green, light brown to dark brown, or even black, they are slightly flattened. The seed's scar, which designates the areole's point of attachment, is where the elliptical, 6.5-7 mm x 4 mm areole opens.

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Chemical constituents:According to reports, the primary constituents of A. farnesiana's essential oil are methyl salicylate, anisaldehyde, geraniol, nonadecane, benzaldehyde, and geranial. A. farnesiana seeds were also used to isolate a number of non-volatile terpenes, including diterpene glycoside (such as farnesiaside). According to reports, the mucilage from A. farnesiana pods contains polysaccharides like arabinose, xylose, galactose, glucose, and mannose.

The pods also contain phenolics, flavonoids, their glycosides, and galloylglycosides, including gallic acid and a number of its derivatives, including ellagic acid, m-digallic acid, and methyl gallate. Flavone diosmetin, sitosterol glucoside, and flavone farnesin, such as 7,3′-dihydroxy-4′-methoxyflavone, have all been found to be present in A. farnesiana seeds. There have been claims that the leaves of A. farnesiana contain a variety of flavonoids, including apigenin-6,8-bis(C-D-glucopyranoside). Numerous amounts of tannins are also present in the tree's leaves, pods, and bark.According to reports, A. farnesiana pods contain an amino acid that contains sulfur, such as N-acetyl-l-djenkolic acid, which explains why the roots of this plant produce a significant amount of carbon disulfide. Cyanogens, such as linamarin and lotaustralin, have reportedly been found in the dried leaf of A. farnesiana.

Anisaldehyde, benzoic acid, benzyl alcohol, butyric acid, coumarin, cresol, cuminaidehyde, decyl aldehyde, geraniol, hydroxyacetophenone, methyleugenol, methyl salicylate, nerolidol, palmitic acid, salicylic acid, and terpineol have all been reported to be present in cassie. Lipids, carotenoids, alkaloids, reducing and non-reducing carbohydrates, and lipids are all present in the leaves. Seven polyphenols (gallic acid, ellagic acid, m-digallic acid, methyl gallate, kaempferol, atomadendrin, and narigenin) were extracted and identified from pods by El Sissi et al. in 1973. Along with naringenin, glucose, and gallic acid, they also discovered narigenin-7-glucoside and naringenin-7-rhamnoglucoside (naringin).Solid, waxy, dark yellow or brown mass is Cassie concrete. Concrete generates 30–35% cassie absolute after alcohol extraction.

This absolute is a viscous, dark yellow to pale brown liquid that is clear at 20°C but crystallizes into waxy flakes at lower temperatures. Its aroma features a herbaceous-flowery top note, a very warm, powdery-spicy, yet floral body, and a strong, cinnamic-balsamic dry-out. It pairs well with a variety of aromatic compounds.

Cultivation: Although it likes a long dry season and can withstand a wide range of annual rainfall (up to 4000 mm), A. farnesiana is primarily found as a dominating component of secondary vegetation in arid areas. Its habitat in Australia receives 150–700 mm of rainfall annually. It occurs between sea level and 1500 m above sea level and requires a mean annual temperature of 15 to 28 °C.In Malesia, it grows up to 400 meters in altitude naturally, and up to 1200 meters in cultivation.Frost is tolerable down to -5°C. It grows scattered or in tidy, open stands on heavy soils such as black clays, loamy, savanna grasslands, tidal flats, sandy river banks, brushwood, and waste ground.

Utilizing a variety of computers and software, molecular docking studies can be carried out to comprehend and forecast intermolecular interactions, identify plausible binding modes, and energetically forecast binding affinity. In the field of drug development, it has a wide range of functions and applications, including the identification of possible leads through virtual screening, the provision of binding hypotheses, chemical mechanism investigations, and the performance of structure-activity studies. Macromolecules, which are protein receptors, and ligands, are typically docked together in a range of orientations, conformations, and locations. For finding hits and leads in screening databases, virtual screening based on chemical descriptors and physical characteristics of active ligands is incredibly helpful. Molecular docking, when used as the last step in virtual screening, helps produce three-dimensional structural hypotheses about how a ligand interacts with its target. AutoDock, Dock, flexX, GOLD, ICM, and PyRx are some of the tools that assist users in molecular docking.

Molecular docking studies and pharmacokinetics studies were employed to examine the effects of potential phytochemicals such as gallic acid, naringenin, kaempferol, rhamnocitrin, apigenin, ellagic acid, ferulic acid, methyl gallate, myricetin, quercetin, diosmetin, and caffeic acid from Acacia farnesiana as angiotensin converting enzyme inhibitors, anti-inflammatory and anti-oxidant agents against SARS-CoV-2 spike protein. The goal of the study is to determine how well the active chemical blocks the target protein, which is essential for viral entry into the host. Additionally, this study will contribute to the creation of a COVID-19 antiviral drug and enlighten the public on how to use natural

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substances in daily consumption as a COVID-19 sickness preventive approach.

Therapeutic uses: There are numerous applications for A.farnesiana in conventional medicine. The bark's medical benefits include treating coughs and acting as an astringent, for example, to stop bleeding gums. In Java, women who have given birth use cassie flower as an emetic. In the Philippines, it is used as an injection to treat leucorrhoea and as a decoction to cure a prolapsed rectum. Ulcers and lesions that have been cleaned with the decoction are then covered with a lotion or a poultice made from the sensitive leaves. For sore throats, the roots are chewed, and a decoction of them is used as a treatment for Tuberculosis.

To treat gonorrhea and bladder ailments, the delicate leaves are crushed with a little water and then consumed. In Martinique, the blossoms are used as a stimulant and an antispasmodic. In Mexico, the flowers' infusion is used to treat dyspepsia, and an ointment produced from them is used to treat headaches. The green fruit is extremely astringent and is used in a decoction to treat inflammation of the skin and mucous membranes as well as diarrhea. In France, the pod pulp is used as a purgative.

Plants spontaneously create phytochemicals as secondary metabolites. In addition to giving plants their distinctive color, flavor, and perfume, phytochemicals are crucial in the control of plant cell processes. Additionally, a growing body of research has revealed that phytochemicals provide significant medical benefits and few adverse effects. Therefore, a crucial stage in the pharmacological discovery of plant-derived medications is the characterisation and evaluation of phytochemicals.

Both the extraction of active phytochemicals from plant materials as well as the detection and analysis of the target phytochemical contents are necessary for standard phytochemical assays. As a pioneer in plant biotechnology lifeasible offers a wide selection of conventional and cutting-edge techniques for plant extraction and phytochemical detection.

A qualitative analysis of the freshly prepared crude extract revealed the presence of phytochemical components including alkaloid, carbohydrate, flavonoid, glycoside, tannin, steroid, and saponin. These were recognized by distinctive color changes using accepted practices. Plants naturally contain phytochemicals, which have biological relevance since they are vital to the plants' ability to fight themselves against a variety of pathogenic bacteria by displaying antimicrobial action through inhibition or killing mechanisms.

Both qualitative and quantitative analyses are used in phytochemical analysis. Quantitative analysis considers the quantity or concentration of the phytochemical present in the plant sample, whereas qualitative analysis focuses on the presence or absence of a phytochemical.The method of Trease and Evans (1983) was used to conduct a qualitative phytochemical test to identify the presence of alkaloids, tannins, saponins, flavonoids, glycosides, and phenols. The amount of the component present is determined by how intense the coloration is.

To identify the major classes of compounds (tannins, saponins, flavonoids, alkaloids, phenols, glycosides, steroids, and terpenoids) present in the extracts, confirmatory qualitative phytochemical screening of plant extracts was carried out using established protocols.

Purpose:Phytochemicals are produced by all plants, including grains, fruits, vegetables, beans, and legumes. They support the plant's defense against bacteria, fungus, viruses, and parasites as a component of the immune system. Humans can receive some of the same protection from phytochemicals.

Pharmacology is the study of how a drug affects a biological system and how it interacts with the body.Jonathan Pereira (1804–1853) is credited as the discipline's creator. The origins, chemistry, biological effects, and therapeutic applications of medications are all covered by this field. Despite the carboxylic group's presence, the medication nevertheless exhibits a high level of pharmacological action. Prostaglandins, cromolin and related anti-asthmatics, arylacetic acids that reduce inflammation, and -lactam antibiotics are a few examples.

The positive or negative effects that a medication has on living organisms are referred to as a drug's biological activity or pharmacological activity in pharmacology. When a drug is a complex chemical mixture, the substance's active ingredient or pharmacophore exhibits this activity, however it can be changed by the other constituents.

II. PHYTOCHEMICAL EVALUATION OF ACACIA FARNESIANA

In Acacia farnesiana,many phytochemical tests were performed and reported.Mainly the Acacia farnesiana had high source of alkaloid content.The alcoholic extract of Acacia farnesiana leguminosae pods was used to identify the bioactive compound by using preliminary phytochemical test.The TLC(Thin Layer Chromatography) method also used for the extraction of bioactive compound of Acacia farnesiana.The folin-ciocalteu reagent method should be used to identify the quantification of total phenolic content.By using soxhlet apparatus,the shade dried grounded powder of A.farnesiana pods were prosperously extracted with petroleum ether,chloroform and alcohol.

A.farnesiana contain high level of alcoholic compound.By comparing the other two extraction method,the alcoholic extraction method was most popularly used to identify the bioactive compound due to high amount alcoholic content.The major bioactive compounds were present in the alcoholic extact of leguminosae pods.The chemical constituent like gallic acid ,ellagic acid,methyl gallate ,ethyl gallate,narigin,naringenin7-O(4”,6”-digalloylglucoside),naringenin7-O(6”-galloylglucoside),naringenin and kaempferol in were present in leguminosae pods.In which we analyze various phytochemical, which are useful for preventing various diseases.

Both aqueous and organic extracts shows antioxidant activity.All extract of Acacia farnesiana possess a positive effect on the interleukins,COX and immunohistochemistry assays.All A.farnesiana pod extract can be effectual as antioxidant and topical anti-inflammatory agents.Twelve phenolic compounds were identified by different analysis technique which include methyl gallate,gallic acid ,galloyl glucose isomer 1,galloyl isomer 2,gallolyl glucose isomer 3, digallolyl glucose isomer 1,digallolyl glucose isomer 2,digallolyl glucose isomer 3,digallolyl glucose isomer 4,hydroxytyrosol acetate,quinic acid,caffeoylmalic acid . Methyl gallate was identified in the six extract.The gallic acid was derived in the chloroformic,methanolic:aqueous and aqueous extract. In the phytochemical study of Acacia farnesiana extracted several chemical compounds, those are alkaloid,terpenoids ,saponins, tannins, proteins, flavonoids , glycosides, steroids by using standard chemical protocol.

2.1 ALKALOIDS:

Alkaloids generally found in various plants .Several extraction method were used to determine the alkaloid content in plants. In acacia farnesiana ,the alkaloid content was high.Alkaloids are naturally occurring toxic amines produced by plants.It mainly act as a defence mechanism to protect themselves against herbivores.The main toxic consequence of alkaloids evolve in troubling to the central nervous system,digestive process,reproduction and immune system.Generally alkaloids are used for treating bacterial infections,inflammatic condition,analgesic,local anesthetic, hypnotic, psychotropic,abnormal proliferative and mitotic condition. The following tests are used to determine the alkaloids-dragendorff’s test,Mayer’s test,Wagner test,Marne’s test,Hager’s test.

2.2 FLAVANOIDS:

Flavonoids comprised of huge group of water soluble polyphenolic compounds having benzo-gamma-pyrone structure and are ubiquitously present in plants.Phenylpropanoid pathway should be used for synthesizingthe flavonoids. Flavonoids are normally and widely distributed group in many plants and occurring virtually in all plant parts,mainly in the photosynthesing plant cells.Flavonoids are major colouring components of flowering plants.They are integral part of human and animal diet.Flavonoids has some medicinal benefits.Those are antitumor,antioxidant, anti-inflammatory,anti-viral activities.Flavonoid are also present in Acacia farnesiana.The following tests should be used for determination of flavonoid-Alkaline reagent test,shinod’s test,sulphuric acid test,lead acetate solution test.

2.3 GLYCOSIDES:

Glycosides represent a large group of secondary metabolic products and derived from several plants.They demonstrating many known function such as growth regulation,allelopathic(inhibition of other plant growth) , defense mechanisms against damage induced by herbivores and pathogens .They contain two bound portion.The first portionsugar moiety that named glycone and the second portion known as aglycone or genin.Glycosides act as a medicine to treat the heart failure and certain irregular heartbeats.It can be poisonous if taken in high amounts.In A.farnesiana ,glycosides are found by many extraction methods.Common tests used for the determination of glycoside are keller-killiani tests,antimony trichloride test,tetranitro methane test,modified brontrager's test.

2.4 PROTEINS:

Proteins are the building blocks of living being.Protein is occur in every human cell.The basic building block of protein is made of up amino acid chains.Proteins play a most significant role in our body.They rectify the damaged cells and generate new ones.Proteins are present in red blood cells that transport oxygen throughout the body(Oxygenate).We must have protein in our daily life.Proteins are good for our bones,it reduce the blood pressure,help in weight loss,it maintain the proper PH level in the body and also maintain the fluid balance.The alcoholic extract method is used to find out the protein occur in Acacia farnesiana.The chemical test for proteins are million's test,biuret test,xanthoproteic test,ninhydrin test, CSF myelin test.

2.5 TANNINS:

Tannins are complex phenolic compounds,it found in many plant species.Generally tannins are occur in fruits, berries,chocolates and other dietary components and because of their ability to bind and precipitate proteins.All tannins have some common features,which is classify two main groups.The first one is Hydrolysable tannins, and that have three types.Those are gallotannins, ellagitannins,and complex tannins(sugar derivatives – mainlyglucose,gallic acid,and ellagic derivatives).Then the second one is condensed tannins.Which is more resistant tomicrobial degradation then the hydrolysable tannins exhibit stronger antibacterial,antiviral and antifungal activity.This is used for making theleather,dyeing fabric, inkand various medicinal applications.Those are ulcer,haemorroids,minor burns,frostbite,inflammation of gums,diarrhea,intestinal catarrh and act as the antidode for heavy metal poisoning.Acacia farnesiana had a tannin content so it also used in many treatment.The following tests are used to identify the tannin content those are gelatin test,gold beater's skin test, phenazone test,ferric chloride test,vanillin HCL test, matchstick test,bromine water test, lead acetate test.

2.6 STEROIDS:

Steroids classified into two types which is natural compounds and synthetic organic compound. Steroid plays a vital role in biology, chemistry and medicine. Steroids also called as a corticosteroids and glucocorticoids. These steroids are similar to hormones that are produced by adrenal gland. It fights against stress associated with illness and injuries.Corticosteroids are used to treat arthritis,asthma,autoimmune disease such as lupus and multiple sclerosis,skin condition such as eczema and rashes and some kind of tumors. Steroids are powerful medicines at the same time it parallellycause side effects like bone weakness and cataract. It can be used for short time period to prevent harmful side effects.Some sports persons take steroids to help them run faster, hit farther,lift heavier weights,jump higher or have one more endurance. Steroids are slightly present in the Acacia farnesiana that help in the treatment of some diseases. The identification tests for steroids are Liebermann-Burchard test, salkowski reaction test, sulphur test.

2.7 SAPONIN:

Saponins are naturally occurring surface active glycosides produced by plants,lower marine animals and some bacteria.Saponin occurs essentially in a great many plant species in both wild plants and cultivated crops.Beans especially have saponins varying degrees of hemolytic and foam producing activity.Saponin reduces the blood lipids, lower cancer risks and decrease the blood glucose response .A high level of saponin content is used in the inhibition of dental caries, platelet aggregation, treatment of hypercalciuria in humans and act as aantitode for lead poisoning. The alcoholic extract of Acacia farnesiana determines that saponin content .The following tests are used for identification of saponins froth test,hemolysis test,foam test.

III. PHARMACOLOGICAL ACTIVITY OF ACACIA FARNESIANA:

3.1 ANTIMICROBIAL ACTIVITY

An antimicrobial is a substance that either eliminates or inhibits the growth of bacteria. Antimicrobial drugs can be categorized based on the microorganisms they are most effective against. Antibiotics are used to treat bacteria, whereas antifungals are used to treat fungi.

Antimicrobial activity: Minimum inhibitory concentration (MIC) values for the most prevalent Gram-positive and Gram-negative pathogens are tabulated for antibacterial drugs, with members of the same drug class appearing in the same Table. The published MIC values presented are representative values, typically based on fully susceptible strains, because reported MIC values vary, sometimes rather significantly, depending on the methodology and source of the microorganisms examined. The text describes activity against additional pertinent diseases. Microorganism nomenclature is done in accordance with current guidelines (for instance, all clinically significant salmonellae are classified as Salmonella enterica serotypes rather than specific species).

Plants may be sources of antimicrobial compounds, and microbial diseases are a significant global health issue .The recent emergence of bacterial strains with lower resistance to antibiotics and the rising incidence of multi-drug resistant bacteria strains enhance the threat of incurable bacterial illnesses, making the quest for new infection-fighting techniques even more urgent .Different solvent fruit extracts from Acacia farnesiana were tested in the current investigation against a variety of human infections. In order to separate the active chemicals using bioactivity guided fractionation, it was necessary to choose plant species with higher activity.

Several extracts of herbs and spices, as well as essential oils from thyme, oregano, parsley, cilantro, and cinnamon, have been shown to have antimicrobial action in vitro. It has been demonstrated that different doses of these extracts of culinary herbs and spices in the culture medium suppress the growth of certain bacterial strains. Alkaloids, phenolics/polyphenols, terpenoids and essential oils, lectins and polypeptides, and essential oils are some of the several types of antimicrobial phytochemicals. Comparing phenols and polyphenols to other phytochemical groups, phenols and polyphenols have more antibacterial modes of action. They have the capacity to combine irreversibly with the nucleophilic amino acids in proteins, inactivating them and causing bacteria to cease functioning as a result. The disruption of microbial membranes, inactivation of microbial enzymes, and activation of the immune response by macrophage stimulation have all been linked to phenolic and polyphenol compounds.Acacia farnesiana possess antimicrobial activity.

The literature contains several reports of the antibacterial properties of the extracts, essential oils, and other parts of C. citratus. But the antibacterial effectiveness varies according on the plant components used, the method of extraction, and the protocols used. Few of the research listed here demonstrated that C. citratus effectively combated important Gram-positive and Gram-negative bacteria. Gram-negative bacteria like Escherichia coli, Klebsiella pneumonia, and Pseudomonas aeruginosa apparently formed an outer barrier to protect themselves from the effects of the C. citratus extracts, according to a finding. Shielding is lessened in Gram-positive bacteria, though.

By using the broth microdilution method, the ability of A. farnesiana extract to stop the growth of several bacterial and fungal strains was assessed. In the broth microdilution method, the presence of a reddish pink color after the addition of tetrazolium salt showed the existence of microbial growth.The minimal inhibition concentration was determined to be the lowest concentration of extract that prevented the growth of the test microorganisms as shown by INT. The antibacterial property of an extract is shown by the MIC value. Extract was considered to be active if the MIC was less than 1 mg/ml. Since Staphylococcus aureus and Escherichia coli had MICs more than 1.0 mg/ml and Bacillus subtilis MIC was determined to be 0.8 mg/ml in an ethanolic extract of A. farnesiana leaves, the extract was deemed ineffective against those bacteria.

To assess or screen the in vitro antimicrobial activity of an extract or a pure chemical, a range of laboratory techniques can be applied. The disk-diffusion and broth or agar dilution procedures are the most well-known and fundamental techniques. Other techniques, such as the technique of poisoned food, are utilized specifically for antifungal testing.

Gram positive bacteria are typically more vulnerable to plant extracts than gram negative bacteria, and E. coli has been discovered to be resistant to plant extracts.Even so, the extract's antibacterial activity against B. subtilis was only marginally higher than that of Gentamicin (MIC = 0.05 mg/ ml). The MIC for bacteria is often lower than that for fungal growth because, in contrast to bacteria, eukaryotic cells in fungi are more difficult to stop. The final concentration of the extract was increased in the direction of the fungus because it had no inhibitory action at the final dose of 1.0 mg/ml. The extract's MIC against Saccharomyces cerevisiae was 2.5 mg/ml, whilst Candida albicans showed no action at a final concentration of 5 mg/ml.

3.2 ANTIOXIDANT ACTIVITY:

Studies have shown that diets high in fruits and vegetables, which are great providers of antioxidants, are healthy. However, studies have not shown that taking antioxidant supplements can prevent disease. The tiny molecule antioxidants neutralize the ROS and eliminate them from the system through a process known as radical scavenging. The glutathione (GSH), vitamin C, vitamin E, carotenoids, and vitamin E are the main antioxidants in this group.Antioxidants are substances that stop oxidation, a chemical process that can lead to the creation of free radicals. Organic molecules, including those in living organisms, degrade due to oxidative stress.

To increase the useful lifetime of industrial products including polymers, fuels, and lubricants, antioxidants are commonly added.Free radicals can harm cells, but antioxidants can stop or lessen this damage. The body creates unstable molecules called free radicals as a response to pressure from the environment and other factors. They may raise your chance of getting sick and getting inflamed.

Foods and medicinal plants are rich sources of natural antioxidants. These organic antioxidants, particularly the carotenoids and polyphenols, have a variety of biological effects, including those that are anti-inflammatory, anti-aging, anti-atherosclerotic, and anticancer. Exploring potential antioxidant sources and promoting their use in functional meals, medications, and food additives depend on the efficient extraction and accurate assessment of antioxidants from foods and medicinal plants. The current research contains in-depth information on environmentally friendly extraction methods for natural antioxidants, evaluation of antioxidant activity at the chemical and cellular levels, and their primary sources from culinary and medicinal plants.

Leeks, onions, and garlic contain allium sulphur compounds, which are good sources of certain antioxidants.

Berry, grape, and eggplant contain anthocyanin's. Pumpkin, mangoes, apricots, carrots, spinach, and parsley all contain beta-carotene. Red wine and tea contain catechins. Shellfish, lean meat, milk, and nuts all contain copper.

Antioxidants are also made from acacia farnesiana.The antioxidant activity was measured using the capacity to chelate iron, reducing property, scavenging DPPH radical, and nitric oxide. Each antioxidant assay was reacted to by the ethanolic extract of A. farnesiana in a concentration-dependent manner. When tested using a broth microdilution assay, the extract has Mic values of 0.8 mg/ml against Bacillus subtilis and 2.5 mg/ml against Saccharomyces cerevisiae. The lethality test on brine shrimp showed that there was no cytotoxicity. The Folin-Ciocalteu reagent was used to determine the total phenol content of A. farnesiana leaves, and the findings indicated 209.78 3.21 mg gallic acid/g ethanolic extract. The extract has undergone preliminary identification of flavonoid galloylglycoside and flavonoid glycosides using both HPLC-PDA and LC/MS.It was possible that the contents were affected by the extract's processing.The antioxidant activity of an extract has been attributed to a variety of mechanisms. The antioxidant's ability to chelate metal significantly decreased the amount of transition metals involved in lipid peroxidation.

The formation of free radicals and the stimulation of lipid peroxidation by transition metals like iron ($Fe2+$) have been characterized as contributing to the disruption of membrane protein function. The fungal strains were Candida albicans and Saccharomyces cerevisiae.They came from Chulalongkorn University's Department of Microbiology in the Faculty of Pharmaceutical Sciences. On Muller-Hinton and Sabouraud agar, respectively, both bacterial and fungal strains were kept alive.

24 hours before use, the subcultures were prepared. The turbidity of the microbial culture was adjusted to match the 0.5 Mc Farland standard by suspending two to three colonies in normal saline from a 24-hour-old plate. Then, a microbial suspension in broth was made by mixing 1 ml of Muller-Hinton or Sabouraud broth with 10 l of regular saline microbial suspensions. The experiment was performed as directed with some changes.

50 l of the microbial suspension in broth was added to the wells containing 50 l of the plant extract (final concentrations: 0.2-1.2 mg/ml for bacteria and 1.0 to 5.0 mg/ml for fungi) or control in a sterile 96-well microplate. To prepare the control, 50 l of DMSO were diluted with 1 ml of broth. 20 l of P-iodonitrotetrazolium (INT) reagent dissolved in water (1 mg/ml) were added to each well after 20 hours of incubation at 37 °C. The MIC of an extract was defined as the lowest concentration of extract inhibiting the growth of test microorganisms as demonstrated by INT.An antibiotic reference was gentamicin.

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3.3 ANTI-ULCER ACTIVITY:

Antiulcer activity is defined as an effort to prevent or treat ulcers, particularly those that affect the duodenum or stomach walls.Additionally, Acacia farnesiana has antiulcer properties.A rupture in the gastrointestinal mucosa lining that is surrounded by acid and/or pepsin characterizes peptic ulcers, a collection of diverse illnesses. Ingestion of NSAIDS is linked to erosions; petechiae type C gastritis, ulceration, obstruction of ulcer healing, problems from ulcers, and damage to the small and large intestine.

Although there are many antiulcer medications, including H_2 receptor antagonists, proton pump inhibitors, and cytoprotectants, all of these medications have drawbacks and restrictions. Herbal medicine is said to be safer due to its natural ingredients and lack of negative effects. Acacia farnesiana (aroma) is also referred to as Mullatumma and Kamputumma in local dialects, as well as Aroma and sweet acacia. Cultivated all over India and frequently planted in gardens. If we look at its output, India and other Eastern nations produce a lot for domestic consumption, and trees start to bloom after the third year, primarily from November to March5. This plant's bark is employed as an astringent and demulcent. The roots and leaves are utilized for therapeutic purposes. Indians wash their teeth with woody branches.

For their effective efficacy against specific hepatotoxins, herbs including Andrographispaniculata, Eclipta Alba, Picrorrhizakurroa, Silibummarianum, Phyllanthus, and Trichopuszeylanicus are suggested. The importance of the numerous chemicals with hepatoprotective and anti-ulcer properties, especially flavonoids, cannot be overstated.

The chewable roots can help relieve sore throats. This plant's roots are also used as an aphrodisiac, astringent, demulcent, febrifuge, stimulant, antispasmodic, diarrhea treatment, and for treating rheumatism. This plant's floral infusion is used as an appetite stimulant. Additionally, it is utilized for neuroses and dyspepsia. Mexicans apply dried leaf powder to wounds. When applying ointment on the forehead to treat headaches, add flowers. Dysentery, skin inflammations, and mucous membrane inflammations are treated with green pod decoction.

Colombians take typhoid baths in a bark concoction. Costa Ricans use the pod infusion for diarrhea, leucorrhea, and uterorrhagia and decoct the gum from the trunk for constipation. The pod was used by Cubans and Panamanians to treat conjunctivitis. The pod decoction is used in Cuba to treat sore throats. West Indians attach bark strips to the painful joint to treat rheumatic pain. A traditional cure for tuberculosis has been proposed using the root decoction.

In hot baths, the root's decoction is supposed to treat stomach cancer. It is claimed that a plaster created from the pulp can reduce tumors. The leaves are reported to include lipids, carotenoids, alkaloids, flavonoids, reducing and non-reducing sugars, and seven polyphenols (gallic acid, ellagic acid, m-digallic acid, methyl gallate, kaempferol, atomadendrin, and narigenin), according to preliminary phytochemical research. Additionally, naringenin, glucose, and gallic acid were discovered, along with narigenin-7-glucoside and naringenin-7-rhamnoglucoside (naringin). This plant's Quercetin, another phytochemical component, has been proven to have antioxidant properties. Numerous flavonoids have antiulcerogenic action, according to several recent findings. A good level of gastric protection was shown following oral administration of the ether portion of the flavonoid extract.Protein and hexosamine levels rose proportionately to the rise in mucus content.

When investigated, it was discovered that quercetin, kaempferol, morin, myricetin, and rutin all inhibited mucosal platelet activating factor in a dose-dependent way, indicating that their protective effects may be mediated through endogenous PAF10. Numerous biological benefits of flavonoids include their ability to reduce inflammation, prevent liver damage, and treat ulcers.

3.4 ANTHELMINTIC ACTIVITY:

Many helminths dwell in the gastrointestinal system, while others also live in tissues or their larvae move into tissues.Antihelmintics are drugs that either eliminate invading helminths or kill them.Antihelmintic medications are used to treat parasite infections. They eliminate parasites by: Attaching to nerve and muscle cells, paralyzing them, and ultimately killing them. Preventing the transport of glucose by the cells, which renders the parasite paralyzed. In many underdeveloped nations, large deworming programs for school-aged children use pills containing anthelmintic. Mebendazole, albendazole, and praziquantel are the recommended medications for schistosomiasis and tapeworms, respectively.

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Condensed tannins (CT) generated from plants have the potential to replace synthetic anthelmintic medications in the treatment of gastrointestinal helminth infections. The majority of research on condensed tannins anthelmintic properties has been done on parasites in ruminant animals. Anthelmintics, also known as antihelminthics, are a class of antiparasitic medications that eliminate parasitic worms (helminths) and other internal parasites from the body without seriously harming the host.

Young children are mainly affected by gastrointestinal nematodes (GI), such as hookworms, whipworms, and roundworms.Globally, GI nematodes are present in more than 10% of the population.Since there are currently no vaccines on the market, helminth control relies on a small number of powerful medications known as anthelmintics. However, because these medications are often misused, serious drug resistance issues arise on a global scale, necessitating the urgent search for new anthelmintic medications, chemotherapy is the best option for humans. Intestinal nematodes and tissue or blood nematodes are the two forms of parasitic nematodes that affect humans. Ancylostomaduodenale, Trichuristrichiura, Ascarislumbricoides, Enterobius vermicular is, Strongyloidesstercoralis, and others are intestinal worms.

The most significant helminthiasis, which are to blame for neglected tropical diseases, are soil-transmitted schistosomiasis and helminthiasis. Helminths live in the GI tract of their hosts and feed off living hosts, stealing nutrients from the host and causing infection/diseases. They are typically more common in children. Through immune system dysfunction, it also contributes to the burden of indirect disease, such as malaria, tuberculosis, and acquired immunodeficiency syndrome. One of the most common infections in people is helminthiasis. Helminths are the primary cause of most illnesses. These are typically found in tropical areas, pose a health risk, and increase the prevalence of undernutrition, anemia, eosinophilia, and pneumonia.

According to the World Health Organization (WHO), worms are the cause of parasitic illnesses in over two people. Worm infections in the digestive tract are easier to treat than those that affect other parts of the body. Therefore, since the dawn of time, the main goal of biomedical research has been the control of helminthiasis.

When compared to synthetic medications, anthelmintics from natural sources play a critical role in the treatment of various parasite infections without side effects. By 2025, it is predicted that 57% of people living in developing nations would be affected. Infections with helminths are now understood to contribute to a wide range of acute and chronic illnesses in both cattle and humans. The majority of cattle have worm diseases, and more than half of the world's population has one type of infection or another. The majority of currently available anthelmintics cause side effects such diarrhea, abdominal pain, loss of appetite, nausea, and vomiting.

A medicinal plant called Acacia farnesiana thrives in the tropical regions of the Indian subcontinent, particularly in the sandy soils of Northern India's riverbeds. When compared to a common medication like albendazole, the methanolic extract of Acacia farnesiana produced a significant anthelmintic action against Pheretimaposthuma. This activity required focus. The extract produces its greatest impact as the concentration rises. The fastest focus paralyzed and killed the earthworm in the shortest amount of time. Pheretimaposthuma, an Indian earthworm, is paralyzed by the methanolic Acacia farnesiana extract. As an anthelmintic, Acacia farnesiana's product is employed. Additionally, it is possible to investigate the active components causing the anthelmintic activity.

3.5 ANTIDIABETES ACTIVITY:

The heart, blood vessels, eyes, kidneys, nerves, and other organs of a diabetic are severely harmed by elevated blood glucose (or blood sugar) levels, which are chronic metabolic disorders. Every circumstance results in a blood sugar increase. The pancreas' insufficient insulin production is the cause of this. Both types of diabetes may develop as a result of a combination of inherited and environmental factors. It is unknown what these components might be.

Diabetes mellitus (DM), a dangerous degenerative disease, affects at least 10% of individuals globally. Effects of DM include hypertension, atherosclerosis, issues with the microcirculation, retinopathy, nephropathy, neuropathy, and angiopathy. Despite the existence of several anti-diabetic drugs, DM is still incurable.The majority of the time, the treatment is ongoing, and people may continue to have adverse drug reactions or severe reactions while taking the medications. It is well known that only a very tiny portion of diabetes patients get access to modern therapy because of their poor socioeconomic situation. Consequently, more people are turning to herbal remedies to manage DM. It has been proven that more than 100 Indian plants have varying degrees of hypoglycemic effect.

Many of the drugs that are currently on the market have either been directly or indirectly produced from plants, which have historically been a very good source of pharmaceuticals. About 800 plants, according to ethno botanical data, may have anti-diabetic properties; among them, Momordicacharantia, Pterocarpusmarsupium, and Trigonellafoenumgreacum have all been associated with successful type 2 diabetes treatment. Several of these plants have demonstrated anti-diabetic effects when tested using various experimental methodologies. Alkaloids, glycosides, carbohydrates, amino acids, and inorganic ions are just a few of the plant-derived active principles that have demonstrated activity, including the ability to treat diabetes.

There are also a number of herbal medications for diabetics in the Indian market. There are just a few herbal medications with promising anti-diabetic benefits, though. In some isolated communities in the Tamil Nadu district of Thirunelveli, it is used in traditional medicine to treat diabetes mellitus (DM). The herb is also utilized as a diuretic, antipyretic, and other treatment in ethno medical traditions. Since there is no proof that Acacia farnesiana has anti-diabetic properties, we decided to conduct this study in an effort to support the traditional use of this plant.

Acacia farnesiana has been the subject of few pharmacological and phytochemical studies in the literature to date. In order to confirm Acacia farnesiana's traditional claim to be an anti-diabetic drug, the current study was undertaken to investigate its anti-hyperglycemic action in rats. The plant's active portion is a valuable source for more research that could result in the creation of new medicines. The creation of phytomedicines takes less time and is generally less expensive. Low- and middle-income nations would benefit more from this.However, while developing phytomedicines, ecotype, genotype, and seasonal differences in efficacy and safety, if any, must be identified. The herbal medication does not have a strong hypoglycemia effect on rats like insulin does.

The water extract was most effective at 50 mg/kg, and increasing it to 100 mg/kg did not significantly lower glucose levels. In contrast to insulin and sulfonylureas, it appears that an overdose of this natural medication may not cause hypoglycemia. Additionally, the activity of the 25 mg/kg active fraction was comparable to that of the 5 mg/kg glibenclamide. The severe alloxan diabetic model, where the baseline blood glucose level was greater than 19.4 mmol/L, was used in the current investigation. This model, which features nearly complete cell apoptosis and insulin resistance, is remarkably identical to the type 1 diabetes model. Studies are being conducted to clarify the herbal drug's mode of action.

3.6 ANTI-INFLAMMATORY ACTIVITY:

A typical element of the body's reaction to a disease or harm. Inflammation happens when the body produces substances that prompt the immune system to fight off infection or heal damaged tissue. Once the infection or injury has healed, the inflammatory phase is over. When the inflammatory process either does not end when it should or may start when there is neither an infection nor an injury, it results in an abnormal immune response known as chronic inflammation. Over time, persistent inflammation can cause damage to healthy tissues, cells, and organs. This can lead to ailments like autoimmune diseases, cancer, heart disease, diabetes, asthma, and other conditions.

Acacia farnesiana is used in conventional medical practices to treat inflammation. The study states that theethanolic extract of Acacia farnesiana leaves was examined for its anti-inflammatory potential using models for acute and chronic inflammation created by carrageenan and cotton pellets, respectively. In each of the test models, the ethanolic extract significantly reduced inflammation. Anti-inflammatory medicines may have been developed to treat inflammation because they are mediators that block immune cell trafficking into tissues and lessen the production or activity of pro-inflammatory cytokines.

Plant-derived phytochemicals improve the scavenging abilities against reactive oxygen species (ROS), which aids in maintaining this equilibrium.Additionally, inflammation is a biological response to a variety of internal and external agents and aggressors, such as infections or injuries, which can progress to pathological and chronic phases that harm the host.Plant bioactive substances have the power to reduce the inflammatory cascade mediator activation. If plant bioactive components are examined as extracts, their bioactivity to combat inflammation is increased.

The frequent chemical class closely associated with these effects is the phenols.Phenols and other phytochemicals such amines, alkaloids, essential oils, non-protein amino acids, cumarines, diterpenes, fatty acids, triterpenes, phytosterols, saponins, flavonoids, gums, and tannins are found in the Acacia genus. These phytochemicals' bioactivity and health-promoting qualities include the reduction of some chronic diseases like cancer, obesity, aging, and diabetes.

All extracts reduced the weight of the ear tissue in the ear edema model after the application of TPA (12-O-tetradecanoylphorbol-13-acetate). To stop edema, the extracts performed less well than indomethacin. Likewise, Myeloperoxidase and Interleukin-1 production was inhibited by all extracts. Similar outcomes were shown with IL-6, where all extracts (apart from HE) suppressed this interleukin synthesis.

3.7 ANTIPROLIFERATIVE ACTIVIY:

One of the most severe disorders where aberrant cells invade and cause disruption to the tissues around them is cancer. It starts in the body's cells, where the normal process is upset by the production of excess cells that clump together to create tumors even though they are not required. According to the American Cancer Society's 2015 report, it is the leading cause of morbidity and mortality worldwide, accounting for 21.7 million new cases, 13 million cancer-related deaths, and a predicted increase of 70% by 2030. The limited effectiveness of clinical treatments for cancer, such as radiation, chemotherapy, and surgery, shows that other methods of controlling the disease are urgently needed.

Because they produce secondary metabolites with therapeutic potential such alkaloids, flavonoids, tannins, and phenolics, medicinal plants have been utilized as a treatment for treating human diseases for ages. The secondary metabolites exhibit noteworthy functions and are crucial in the management of cancer. Because secondary metabolites of plants have the potential to maintain health and have the ability to treat a variety of diseases, including cancer, with less harmful effects, they have become a focus and an important alternative to develop the present and future health requirements against cancer. In this regard, Acacia farnesiana, a significant medicinal plant, was taken into consideration for its early research into cancer therapy.

Farnesiana (Linn) A. In the tropical parts of the Indian subcontinent, wild., a thorny bush or small tree, is particularly common in the sandy soils of river banks close to north and south India. It has an 8 m maximum height. Morphologically, the bark is firm and light brown in hue. Branches are glabrous, purplish to gray in hue, and have minuscule glands. Stipules are always brief and flat, rarely longer than 1.8 cm. Two-pinnate leaves have a small gland on the petiole and, on rare occasions, one on the rachis near the pinnae's tip.A leaflet has 10-12 pairs of small, glabrous, leathery leaflets that are 2-7 mm long and 0.75-1.75 mm wide. Pinnae have 2–8 pairs of pinnae. Axillary pedunculate heads, glabrous calyxes, and aromatic corollas are characteristics of flowers.

Dark brown to blackish in hue, indehiscent, straight or curved, 4-7.5 cm long, 1.5 cm wide, glabrous, finely longitudinally striate, and pointed at both ends. The elliptic, thick, and somewhat compressed seeds are chestnut brown, two-rowed, and covered in a dry spongy tissue. They are 7-8 mm long and 5.5 mm wide. Areoles that are 6–7 mm length and 4 mm broad.

A.farnesiana is one of the most important medicinal plants used in the Ayurvedic medical system. It has been utilized for a number of pharmacological objectives, such as the prevention of Vibrio cholera and for its antimalarial, antioxidant, antidiarrheal, and antibacterial activities. As an adsorbent, antiulcer, acetylcholine esterase, bronchodilator, and anti-inflammatory agent, it has also been utilized. Lentin-like protein, cyclopropenoid fatty acids, four new diterpenes-acasiane A, acasiane B, farnesirane A, and farnesirane B-methyl gallate, naringenin, kaempferol, quercetin, and myricetinhave all been identified as the compounds from various parts of the plant.It is remarkable that no research has been done on the ability of A. farnesiana pod to suppress cell proliferation in light of the aforementioned fact and the literature review that shown that phytochemicals present in the pod are active against a variety of pharmacological activities. As a result, this study has looked into the anti-proliferative and DNA cleavage abilities of A. farnesiana pods.

A. farnesiana pod solvent extracts were investigated for their ability to inhibit the proliferation of various cancer cell lines. The n-hexane extract reduced the growth of breast cancer by 21.7%, hepatocellular carcinoma (HePG2) by 10.81%, chronic myelogenous leukemia by 6.41%, and colorectal adenocarcinoma, 4.7%. DCM

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extractinhibited breast cancer by 19.36%, colorectal adenocarcinoma by 6.93%, chronicmyelogenous leukemia by 4.93%, and hepatocellular carcinoma (HePG2) by no inhibition. Hepatocellular carcinoma (HePG2), chronic myelogenous leukemia and breast cancer were all reduced by 24.53%, 23.34%, and 17.6%, respectively, in response to methanol extract .

The results obtained have shown that out of three extracts screened the two, viz., n- hexane and methanol of A. farnesianapod have significant inhibition, and DCM has less significant on different cancer cell lines. The isolation of particular phytochemical from these two extracts can give the compound which is responsible for the inhibition of the three cancer cell lines chronic myelogenousleukemia, hepatocellular carcinoma (HePG2), and breast cancer. The DNA cleavage is found to be effective with all the extracts, especially with S1 and S3 comparing to S2, S4, and S5. Thus, A. farnesianapod is concluded to be significant cytotoxic against the four cell lines mentioned above by MTT assay, and the DNA cleavage by various extracts and the fractions are found to cleave significant at all concentrations.

3.8 ANTIHYPERTENSIVE ACTIVITY:

A transmembrane protein called angiotensin-converting enzyme 2 (ACE2) serves as a coronavirus spike protein receptor. This ACE2 protein performs as a virus receptor, taking part in the biological process known as the viral particle entry in the host cell, when spike protein fragments as the ligand connects with it. Consequently, an in-silico study was conducted because it is more expedient and economical than trial-and-error techniques based on experimental investigations. The impact of Acacia farnesiana phytochemicals on spike protein was investigated using molecular docking studies.

Based on their ACEI and anti-inflammatory properties, twelve phytochemicals from Acacia farnesiana were chosen for this study as small compounds to assess the molecular interaction between the spike protein of SARS-CoV2 and the ACE2 of the human complex molecule. Gallic acid, methyl gallate, kaempferol, naringenin, apigenin, ellagic acid, ferulic acid, myricetin, Diosmetin, caffeic acid, and quercetin were selected as effective natural compounds from Acacia farnesiana as potent small molecules against COVID-19, and additional ADME analysis was conducted. The outcome showed that the bound structure of ACE2 and spike protein becomes unstable as a result of the ACEIs and anti-inflammatory phytochemicals present in Acacia farnesiana. As a result, these organic substances can exhibit antiviral activity by weakening spike protein binding to the ACE2 receptor on the human host.

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the latest global pandemic disease that developed in the year 2019 and is known as COVID-19 or Coronavirus disease 2019. It belongs to the family Coronaviridae, the genus Torovirus, and the order Nidovirales. SARS CoV-2, the eighth member of the coronavirus family to infect humans, was initially discovered in Wuhan, China, in December 2019. These viruses can infect the lower respiratory tract in people, leading to a serious respiratory condition that manifests as fever and dyspnea.

From an infection with no symptoms to multi-organ failure and death, the disease's severity varies. The four families of CoVs, which have an average size of 30 kilobytes (kilobytes), are alpha-coronavirus, beta-coronavirus, gamma-coronavirus, and delta-coronavirus. The SARS-CoV-2 virus is spherical in form and has a spike protein protruding from its surface. The nucleocapsids inside the envelope are helical symmetrical, which is rare for positive-sense RNA viruses . The spike protein is composed of a membrane-proximal S2 subunit at the C-terminus and an N-terminal S1 subunit. The S1 subunit is composed of the domains S1A, S1B, S1C, and S1D. The four main structural proteins of coronavirus particles are the spike (S), membrane (M), envelope (E), and nucleocapsid (N) proteins. Non-structural proteins, which are required for virus replication, make up about two-thirds of the coronaviral genome and include RdRp (RNA-dependent RNA polymerase), proteases, and helicase.

SARS-CoV-2 uses its trimeric spike protein to attach to the host angiotensin-converting enzyme 2 (ACE2) and fuse with the cell membrane in order to gain cell entrance. This helps to synthesize the transmembrane protease serine 2 (TMPRSS2), which is then used by RdRp-mediated replication to allow virus replication inside the host cell. The type I membrane enzyme ACE2, which causes harm, inflammation, and respiratory distress, is located on the surface of endothelial cells in the lungs and other tissues and organs. In addition to serving as a receptor for SARS-CoV-2, it plays a crucial role in controlling blood pressure, preserving blood pressure homeostasis, and managing hypertension. Potential therapeutic

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therapy goals include controlling the immune system and preventing viral entry and replication in cells.

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