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Review Article

A REVIEW OF COMPREHENSIVE STUDY ON MEDICINAL PLANTS OF POLYHERBAL FORMULATION – CHURNA

PRIYA ABRAHAM *[1], M.PARIDHAVI [2]

[1]Prist University, Thanjavur, Tamilnadu, India, [2]Rajiv Gandhi Institute Of Pharmacy Trikkaripur, Kasargod, Kerala- India
Email: peeyampharm @gmail.com

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ABSTRACT

Ayurvedic medicines are the combinations of selected herbal drugs and are manufactured under different pharmaceutical processes to result in various dosage forms such as churnas, bhasmas, liquid, lehas, pill, tablet etc. Churna is defined as a fine powder of drug or drugs in ayurvedic system of medicine. The churna is free flowing and retains its potency for one year, if preserved in airtight containers. Churna formulations are similar to powder formulations in allopathic system of medicine. In recent days churna is formulated into tablets in order to fix the dose easily. These forms of medicament are prescribed generally because of their particle size. Smaller the particle size greater is the absorption rate from g.i.t and hence the greater is bioavailability. Herbal medicine has been enjoying renaissance among the customers throughout the world. Ayurvedic principles show that everyone has a particular personality type as shown by the make up of their dos has, or inner life energies. Your prakriti is your make up when you were born, and vikruti is what they are now as a result of life's experiences and stresses and imbalances of other elemental influences. In order to correct these derangements, one can use churnas, or Ayurvedic spice powders that are made up of blends of spices. These churnas are made of fresh herbs that have medicinal properties, as well as the ability to neutralize the toxic effects caused by imbalances within the body. Ayurvedic churnas combine all six of the ayurvedic tastes: sweet, sour, salty, pungent, bitter, and astringent. They are created through the combination of a number of different fresh herbs, and can be added to almost any foodstuff. Not only do churnas improve the taste of the dish and add their own nutritional kick, they also bring out the medicinal qualities of the foods they are added to. Churna is an ayurvedic poly herbal formulation used for its anti-ulcer, anti-diabetic, wound-healing, antioxidant, immuno modulatory and rejuvenating purpose. In this review article It includes five herbal drugs, ie; dried whole plant part of [1]*Mimosa pudica* (Family: *Leguminosae*), dried rind of *Punica granatum*(Family: *Lythraceae*) ,dried fruit of *Emblica officinalis* (familuy: *Ephorbiaceae*), dried seeds of [2]*Sesamum indicum* (family: *Pedaliaceae*), dried seeds of *Cuminum cyminum(family: Apiaceae*) in powder form .The present review encompasses all the important aspects of polyherbal formulation-churna of above mentioned four plants.

Keywords: Choorna, Mimosa pudica, Punica granatum, Emblica officinalis ,Sesamum indicum, Cuminum cyminum

INTRODUCTION

In the few decades, there has been exponentially growth in the field of herbal medicines. Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. Today about 80% of people in developing countries still relay on traditional medicine based largely on the different species of plants for their primary health care. About 500 of plants with medicinal uses are mentioned in ancient literature and 800 plants have been used in indigenous system of medicine. The various indigenous systems such as Ayurveda, siddha, unani use several plant species to treat different ailments[3,4,5] Tyler defines herbal medicines as "crude drugs of vegetable origin utilized for the treatment of disease states, often of a chronic nature, or to attain or maintain a condition of improved health. "Current demands for herbal medicines have resulted in an annual market of$1.5 billion and increasingly widespread availability. The spices included in Ayurvedic churnas all have strong medicinal properties of their own. Ayurveda has long been touting the health benefits of these herbs. Ground ginger, for example, provides a pungent flavor but also calms the stomach and promotes good digestion. Turmeric contains cur cumin, which is thought to reduce cholesterol, provide a boost to the immune system, aid in liver detoxification, and improve the body's response to allergens. It is a potent antioxidant, which means it helps the body fight off dangerous molecules known as free radicals, which contribute to your risk for heart disease and cancer. Cumin is also known to help the body in its detoxification efforts as well as make digestion smoother. Throughout the world herbal medicines have provided many of the most potent medicines to the vast arsenal of drugs available to modern medical science, both in crude form as well as a pure chemical upon which modern medicines are constructed. The aim of this review is to highlight the taxonomical, chemical quantification and pharmacological investigation carried on the Sesamum, Mimosa, Prunus, Embellica, Cuminu genus, So that further research could be carried out on these plants.

FIG: 1 Seeds of cumin [6]

Fig: 2 Mimosa plant [7]

Fig: 3 Fruits of pomegranate [8]

Fig: 4 Fruits of Amla[9]

Fig: 5.Seeds of sesame[10]

Table No:1 taxonomical Description

SLNO:	NAME OF THE PLANT	BOTANICAL NAME	KINGDOM	ORDER	FAMILY	GENUS	SPECIES
1	CUMIN[11]	*Cuminum cyminum*	Plantae	Apiales	*Apiaceae*	Cuminum	*C. cyminum*
2	MIMOSA[12,13]	*Mimosa pudica*	Plantae	Fabales	*Mimosaceae*	*Mimosa*	*M.pudica*
3	POMEGRANATE[14]	*Punica granatum*	Plantae	Myrtales	*Punicaceae*	*Punica*	*P.granatum*
4	AMLA[15]	*Phyllanth-usemblica*	Plantae	Malpighial es	*Euphorbiaceae*	Phyllanth us	*P.emblica*
5	SESAME[16]	*Sesamum indicum*	Plantae	Lamiales	*Pedaliace*	Sesamum	*S. indicum*

Table No: 2 Vernacular Names

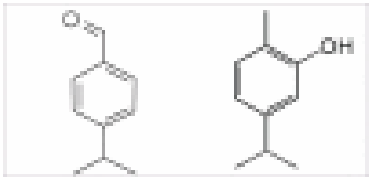
Sl no	NAMEOF THE PLANT	VERNACULAR NAME
1	CUMIN[17]	Eng: cumin Hindi:Jira kan:jirige san:jiraka Tam:jirakam mal:jirakam
2	MIMOSA[18]	Hindi:lajjavanti kan:nacikegida san:lajjalu Tam:Thottavad mal:Thottavadi,Tel:Manugumaram
3	POMEGRA-NATE [19]	Hindi: anar kan: dalimb san: dadimah Tam: madalam Tel: dadima Mal: matalam Eng: Indian goose berry
4	AMLA[20]	Hindi:amla san: dhatriphala Tam: nellikkai Mal: nellikkaya
5	SESAME[21]	Eng: gingelly Hindi: til kan: ellu san: tilah Tam: ellu Mal: ellu

Table No: 3 Morphological Description

Sl no:	Name of the plant	Plant part	Description
1	CUMIN[22]	Leaf seed Flower	Color: dark green to blue green, opposite, ovate Cream-white, charcoal-black
2	MIMOSA[23]	Leaf Flower Fruits & Seed	Color: pale green alternate, bi pinnate very sensitive to to9uch, filaments are pink to lavender, sparingly Prickly with numerous deflexed, bristly hairs pale pink or purple seeds are pale brown .The fruit consists of clusters of 2-8 pods from 1–2 cm long each, seeds:2.5 mm long Taste: slightly bitter
3	POMEGRANA-	Leaf	Color: pale green- dark green leaves are opposite or sub-opposite, glossy, narrow oblong, entire, 3–

	TE[24]		7 cm long and 2 cm broad, astringent membrane alternate, bi pinnate.
		Flower	The flowers are bright red, 3 cm in diameter, with four to five petals
		Fruits&	The edible fruit is a berry, 5–12 cm in diameter with a rounded hexagonal shape, and has thick reddish skin. The exact number of seeds in a pomegranate can vary from 200 to about 1400 seeds. The seeds are embedded in a white, spongy2.5 mm long, edible aril color from white to deep red or purple.
		Seed	Taste: Acrid, bitter, sweet
4	AMLA[25]	Leaf	Color: light green- dark green leaves are simple, sub sessile and closely set along branch lets, light green, resembling pinnate.
		Flower	The flowers are greenish-yellow
		Fruits&	The edible fruit is nearly spherical, light greenish yellow, quite smooth and hard on appearance, with six vertical stripes or furrows. Stony endocarp with seeds
		Seed	Taste: Acrid, bitter, sweet
5	SESAME [26]	Leaf	Color: Leaves are green, common colors are buff, tan, gold, brown, reddish, gray and black, with opposite leaves 4 to 14 cm long with an entire margin; broad lanceolate, to 5 cm broad*, tubular, 3 to 5 cm* long, with a four-lobed mouth. Light green- dark green leaves are simple, sub sessile and closely set along branch lets, light green, resembling pinnate leaves.
		Flower	The flowers are yellow. The flowers may vary in colour with some being white, blue or purple.
		Fruits&Seed	Sesame fruit is a capsule, normally pubescent, rectangular in section and typically grooved with a short triangular beak. The length of the fruit capsule varies from 2 to 8 cm, its width varies between 0.5 to 2 cm, The fruit naturally splits opens (dehisces) to release the seeds. The seeds are ovate, slightly flattened and somewhat thinner at the eye of the seed .The seed coat may be smooth or ribbed.

PHYTOCHEMICALS OF CUMIN Cumin from *Cu. cyminum* respectively, are one of the earliest cultivated herbs in Asia, Africa and Europe have remained popular as culinary spices and are also over whelmingly used in folklore therapy since antiquity in diverse geographical areas .The aromatic substances present in these herbs have attracted enormous attention of researchers worldwide to experimentally validate the therapeutic uses of cumin seeds, which are documented in several indigenous healing systems. Essential oils, oleoresins monoterpene hydrocarbons, oxygenated mono terpenes, oxygenatedsesquiterpenes,saturatedandunsaturatedfattyacids,aldehydes,ketonesandesters.carvacrol,carvone,αpinene,limonene,terpinene,linalool,carvenone, and *p*-cymene,[27,28,29,30], whereas the major compounds occurring in cumin are cumin aldehyde, limonene, α- and β-pinene, 1,8-cineole, *o*- and *p*-cymene, α- and γ-terpinene, safranal and linalool. In aqueous and solvent derived seed extracts, diverse flavonoids, isoflavonoids, flavonoid glycosides, monoterpenoid glucosides, lignins and alkaloids and other phenolic compounds have been found. Several nutrients vitamins, amino acids, protein, and minerals, starch, sugars and other carbohydrates, tannins, phytic acid and dietary fiber components have also been found in cumin seeds [31, 32, and 33].



Structure of cumin aldehyde

Table No: 4 Pharmacology And Research Cumin

Type of the extract	Type of activities reported
Aqueous and solvent derived extracts	1. Antioxidant 2.Antimicrobial 3.Antidiabetic 4.Immunomodulat-ory, 5. anti-cancer

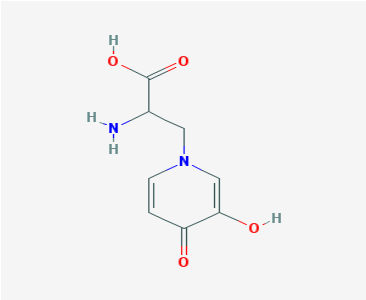
Antioxidant: These effects are documented as their ability to prominently quench hydroxyl radicals, 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radicals and lipid peroxides. The other assays employed were ferric thiocyanate method in linoleic acid system, Fe2+ ascorbate-induced rat liver microsomal lipid peroxidation (LPO), soybean lipoxy genase dependent lipid peroxidation and ferric reducing ability[34-38,39-42] A caraway root extract has also shown significant anti-DPPH radical activity.

Antimicrobial: Revealed a potential antimicrobial activity of cumin. This antibacterial action was assessed against a range of useful and pathogenic gram-positive and gram-negative bacterial strains [43-48].

Ant diabetic: The anti- diabetic effects of cumin products are amply documented[49]In a glucose tolerance test conducted in rabbits, cumin significantly increased the area under the glucose tolerance curve and hyperglycemic peak[**50]**A methanolic extract of cumin seeds reduced the blood glucose and inhibited glycosylated hemoglobin, creatinine, blood urea nitrogen and improved serum insulin and glycogen (liver and skeletal muscle) content in alloxan and streptozotocin (STZ) diabetic rats[51,52]. Oral administration of cumin also showed hypoglycemic effect in normal rabbit, resulting in significant decrease in the area under the glucose tolerance curve [53] .The biologically active constituent of cumin seed oil was characterized as cumin aldehyde which inhibited aldose reductase and alpha-glucosidase isolated from rat.

Immunomodulatory: It stimulated the T cells′ (CD4 and CD8) and Th1 cytokines′ expression in normal and cyclosporine- A induced immune-suppressed mice. In restraint stress-induced immune-suppressed animals, the active compound of cumin countered the depleted T lymphocytes, decreased the elevated corticosterone levels and size of adrenal glands and increased the weight of thymus and spleen. [54]

PHYTOCHEMICALS_OF_MIMOSA_ It is reported to contain tubulin [55], C-glycosyl flavones[56], phenolic ketone[57], a novelbuffadienolide[58], alkaloids,glycoside,carbohydrates, proteins, steroids, flavonoids, tanni,mimosine, tyrosine3,4dihydroxypiridine, mimosinamine , mimosinic acid.



MIMOSINE

Table No: 5 Pharmacology And Research Mimosa

Type of the extract	Type of the activities reported
Methanolic&aqueous extract.	Wound-healing activity, Anti-ulcer
Ethanolic extract	Antioxidant, Antibacterial, anti-fungal, anti-inflammatory, anti-convulsant

Wound healing activity: The total aqueous extract exhibited significant ($P < 0.001$) wound healing activity. The methanolic and total aqueous extracts were analyzed for total phenols content equivalent to Gallic acid. The content of total phenols was 11 %(w/w) and 17% (w/w) in methanolic and total aqueous extract respectively. The methanolic extract exhibited good wound healing activity probably is due to phenols constituents [59,60].

Antioxidant activity: The antioxidant effect of the ethanolic extract of *Mimosa pudica* against free radical damage by different standard methods such as DPPH and Hydrogen peroxide free radical model. The test extract exhibited significant inhibition in Nitric oxide and DPPH free radical formation withIC50 values of 78.1±1.75 and 35.00±1.15 g/ml respectively[61,62]

Antiulcer activity: The aqueous extract at 200 and 400 mg/kg was showed significantly inhibited ulcer formation. There was a significant ($P < 0.01$) dose-dependent decrease in the ulcerative lesion index produced by all the three models in rats as compared to the standard drug lansoprazole [63,64]

Antibacterial activity: The ethanolic extract of 25µl, 50 µl, 75 µl and 100 µl were tested against two bacterial pathogens namely *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* for their antibacterial activity. It was demonstrated by well diffusion method.

Antifungal activity: The ethanolic extract of 25µl, 50µl, 75µl and 100µl were tested against different fungal pathogens *Aspergillus flavus* and *Trycophyton rubrum* for their antifungal activity. It was demonstrated by well diffusion method.

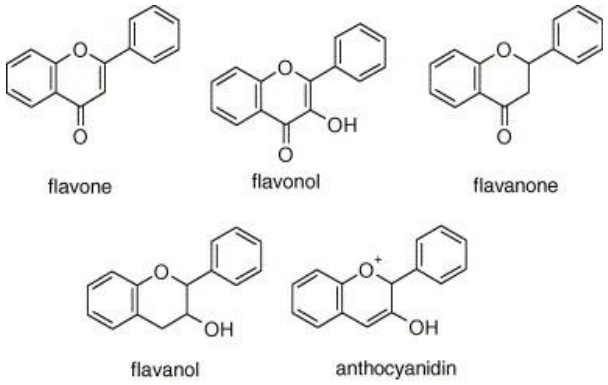
Anti-Inflammatory activity: was studied by Carrageen induced hind paw oedema wistar rats of either sex weighing 150-200 g were divided into four groups containing five animals in each group. Group-I received normal saline solution (control), Group II received Indo methacin (standard 1 mg/kg, I.P.). G9roup-III and IV received extract (250 and500 mg/kg, P.O.) of *Mimosa pudica,* respectively. One hour after treatment; 0.1ml of 1% suspension of carrageen in normal saline was injected into the sub-planner region of left hind paw to induce oedema. The paw volume was measured initially at 1h, 2h, 3h, and 4hr after carrageen in injection using mercury displacement method (Plethysmograph).

Anticonvulsant activity: The decoction of *Mimosa pudica* leaves given intra peritonealy at dose of 1000–4000 mg/kg protected mice against pentylentetrazol and strychnine-induced seizures [65].

Antiasthmatic activity: The aqueous extract of *Mimosa pudica* is showed Histamine induced contraction in isolated goat tracheal chain showed that aqueous extract of *Mimosa pudica* inhibited the contractile effect of histamine ($P<0.05$)[66].

PHYTOCHEMICALS OF POMEGRANATE PEEL

Both flavonoids and tannins are more abundant in the Peels of wild-crafted compared to cultivated fruits [67].Complex polysaccharides from the peels have been studied and partially characterized [68]. The main chemical Constituents isolated from Pomegranate Peel are: hydroxyl benzoic acids: gallic acid, ellagic acid. hydroxy cinnamic acids, caffeic acid, chlorogenic acid, p- coumaric acid, cyclitol carboxylic acids: Qunic acid ,flavon-3-ols/flavonoids and their glycosides: Catechin, epicatechin,epigallocatechin-3-gallate, quercetin, kaempferol, luteolin, rutin, kaempferol-3-O-glycoside,kaempferol-3-O-rhamnoglycoside, naringin, anthocyanins: cyanidin, pelarginidin, delphinidin. ellagitannins, punicallin, punicalagin, corilagin, casuarinin, gallagyldilacton, pedunculagin, tellimagrandin, granatin A, granatin B. alkaloids: pelleteriene



Chemical Structures

Table No: 6 pharmacology and research pomegranate peel

Type of the extract	Type of the activities reported Anti-diabetic, anti-oxidant, hyper lipedemi
Methanolic,ethanolic peel extract	Ic, anti-viral, anti-bacterial, anti-diarrhoeal Anti-inflammatory, anti-cancer.

Anti-inflammatory Activity [69]: The administration of 200 mg/kg of pomegranate peel extract normalized all the adverse changes induced by alloxan, a widely used compound for inducing diabetes mellitus since it increases the serum levels of glucose and α-amylase activity and the rate of water consumption and lipid peroxidation in hepatic, cardiac, and renal tissues, while decreasing serum insulin levels underlining the anti-diabetic and anti peroxidative potential of pomegranate peel extracts.

Antimicrobial [70]: Investigated the in vitro and in vivo antimicrobial activity of pomegranate peel ethanol extract against 16 strains of Salmonella. The minimal inhibitory concentrations were in the range of 62.5 to 1000 µg mL−1.

Anti-oxidant [71]: Methanol extract of pomegranate peel had much higher antioxidant capacity than that of seeds, as demonstrated by using the β-carotene-linoleate and DPPH model systems.

Anti-tumour [72]: Demonstrated what appears to be synergy in the interactions of the extracts from the 3 pomegranate compartments (peels, juice, and seeds) in inhibiting prostate cancer cell proliferation, invasion and phospholipase A-2 expression.

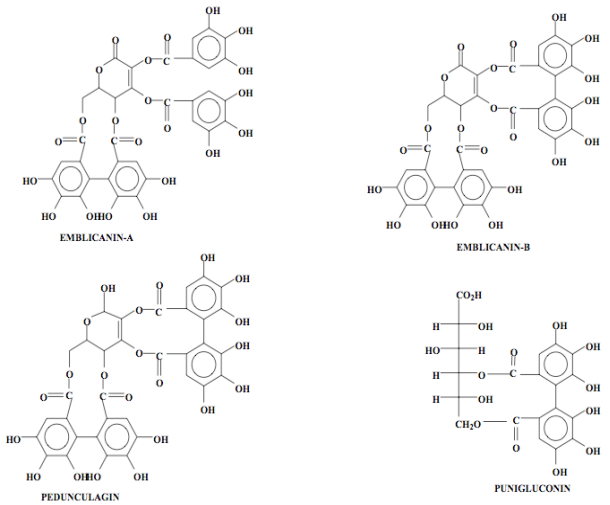
Antiviral properties: Evaluated the 4 major polyphenols in pomegranate extracts, EA, caffeic acid, luteolin, and punicalagin and identified punicalagin as the anti-influenza component, because this compound blocked replication of the virus RNA, inhibited agglutination of chicken RBC's by the virus, and had viricidal effects, inhibited the replication of human influenza A/Hong Kong (H3N2) in vitro. Anti-influenza viricidal activity has also been associated with other flavonoid compounds [73]. Pomegranate extract has been reported to have microbiocidal effects on HIV-1 [74]

Antidiarrheal properties [75]: Aqueous and alcohol extracts of the pomegranate fruit rind in 3 experimental models using albino rats. The extracts exhibited significant activity in rats when compared to loperamide hydrochloride. The results revealed that the extract exhibited a concentration-dependent inhibition of the spontaneous movement of the ileum and attenuated acetylcholine-induced contractions. The antidiarrheal effect of pomegranate peel extract in rats given an oral dose of 400 mg/kg. The results showed that pomegranate peel extract decreased the number of defecations.

Antibacterial properties: Pomegranate peel extract presented maximum antibacterial activity against Listeria mono cytogenes and Salmonella enteritidis[76]. In contrast, Proteus mirabilis and aeruginosa were reported to be highly resistant against the peel extract of Pomegranate [77]. In addition, Pomegranate peel extract was proved to be a potent antifungal agent against citrus green moulds[78].

Anthelmintic properties: Aqueous and methanolic extract of punica granatumpulp against adult Indian earthworm Pheritima posthuma.Various concentrations (50 and 100 mg/ml) of aqueous and methanolic extract evaluated For antihelmintic activity by recording the time required for paralysis and death of worms[79,80]

PHYTOCHEMICALS OF AMLA: 100 gm edible fruit provides 470-680 mg of Vitamin C. Fruit contains moisture, protein, fat, minerals, fibers and carbohydrate. Its mineral and vitamin contents include calcium, Phosphorous, iron, carotene, carbohydrate, thiamine, riboflavin besides vitamin C, tannins, alkaloids, phenolic compounds amino acids carbohydrates, vitamin C, flavonoids, ellagic acid chebulinic acid. Quercetin, chebulagic acid, emblicaninA, gallic acid emblicanin-B, punigluconin, pedunculagin. Citric acid, ellagotannin trigallayl glucose, pectin [81]



Structure of Emblicanin A, Emblicanin B, Punigluconin, Pedunculagin[82]

Table No: 7Pharmacology And Research Amla

Type of the extract	Type of the activities reported anti-oxidant,
Methanolic,ethanolic extract	Anti-pyretic,analgesic,anti-tussive,cytoprotective,gastro protective,Antidiabetic,cardio protective,anti-microbial, memory enhancer,anti-mutagenicity

Anti-diabetic: Oral administration of the extracts (100 mg/kg body weight) reduced the blood sugar level in normal and in alloxan (120 mg/kg) diabetic rats significantly within 4 hours. EO and an enriched fraction of its tannoids are effective in delaying development of diabetic cataract in rats [83].

Cardio protective Activity: The effects of chronic oral administration of fresh fruit homogenate of amla on myocardial antioxidant system and oxidative stress induced by ischemic- (IRI) were investigated on heart in rats.

Antioxidant Activity : Environment or produced within the body, can tip the free Methanol was used to extract the dried fruit rind of radical (pro- oxidant) and anti- free radical (anti-oxidant)balance leading to oxidative stress which may result in tissue injury and subsequent diseases[84]

Antipyretic and Analgesic Activities of *Emblica*: Extracts of EO fruits possess potent anti-pyretic and analgesic activities. A single oral dose of ethanolic extract and aqueous extract (500 mg/kg, i.p.) showed significant reduction in hyperthermia in rats induced by brewer's yeast. Both of these extracts elicited pronounced inhibitory effect on acetic acid-induced writhing response in mice in the analgesic test. This may be due to the presence of tannins, alkaloids, phenolic compounds, amino acids and carbohydrates [85]

Cytoprotective, Antitussive, Gastroprotective Properties of *Emblica Officinali[86]* :EO has been reported for its cyto protective and immunomodulating properties against chromium

Memory Enhancing Effects of Emblica Officinalis[87]: Amla churna produced a dose-dependent improvement in memory of young and aged rats. Amla churna may prove to be a useful remedy for the management of Alzheimer's disease due to its multifarious beneficial effects such as memory improvement and reversal of memory deficits

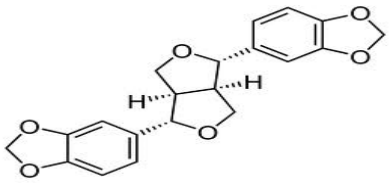
Antimicrobial and Antimutagenicity Activities of Emblica Officinalis [88]: The plant have been reported to posses potent antibacterial activity against Escherichia coli, K. ozaenae, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, S. paratyphi A, S. paratyphi B and Serratiamarcescens

Anticanceractivity[89]:Aqueous fruit of P.emblicaA549 (LUNG) He pG2 (liver) HeLa (cervical) MDA-MB-231 (Breast) SK-OV3 (Ovarian) SW620 (Colorectal) L929 cells Inhibition of cell growth in human ca ncer cell lines Inhibition of cell growth.

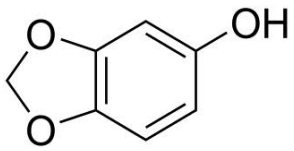
PHYTOCHEMICALS OF SESAME

The seeds by expression yield a fixed oil consisting essentially of the glycerides of oleic and linoleic acids with small preparations of stearin, palmitin and myristin. Sesamin. Liquid fatty acids are present to about 70 % solid fatty acids 12 to 14%. The oil is used widely in the some injectable drug formulations. The lignans such as sesamin, episesamin, sesaminol and sesamolinaremaj or constituents of sesame oil and all have chemically methylene dioxy phenyl group.

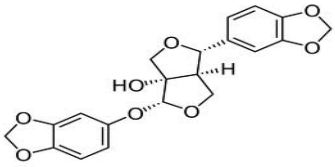
It ranks ninth among the top thirteen oil seed crops which make up 90% of the world production of edible oil. commonly used occlusive moisturizers include sesame seed oil .Occlusive materials comprise vegetable oils,triglycerides, mineral oil, natural or synthetic waxes, fatty acid esters, lanolin oil and its derivatives, and polydimethyl siloxanes, among others. Sesame seeds are a good source of calcium and are therefore suitable for sufferers of osteoporosis. Sesame seeds contain a high amount of the antioxidant phytic acid. Sesame seeds contain the lignans pinoresinol and lariciresinol[90]. Sesame oil contains vitamin E in abundance along with vitamin B complex and vitamin A, which helps nourish and rejuvenate skin. Seeds also have a good amount of manganese, calcium, iron, phosphorous, zinc, vitamin B1, trypthophan and dietary fibres. A new anthraquinone derivative, named anthrax sesamone F, was isolated from the seeds. Sesamin and sesamolin are the most abundant lignans of sesame seeds and the major fat soluble lignans [91]. Sesamin and sesamolin are comprised of benzene and furofuran rings. The structural difference between them is that sesamolin contains oxygen between its benzene and furofuran rings [92].



sesamin



sesamol



sesamolin

Chemical structures

Table No: 8 pharmacology and research sesame

Type of the extract	Type of the activities reported
Methanolic,ethanolic extract	Wound healing activity anti-oxidant, Anti-pyretic,analgesic,anti-inflamatory, Anti-bacterial, Anti-fungal, ,anti-mutagenicity, Hepato protective

Wound healing activity: Sesamum indicum seeds and oil both promote wound healing in experimentally induced wounds in rats. Administration of seeds and oil orally promote the breaking strength, wound contraction and period of epithelialization in incision, excision, burn wound models.

Analgesic, antipyretic, anti- inflammatory: Ethanolic extract of sesamum indicum tested using acetic acid induced writhing model in mice. The extract of 500mg / kg showed inhibition in writhing which was comparable to marketed preparation ibuprofen 50mg/kg[93].sesame oil produced antipyretic effect comparable to paracetamol determined by yeast induced pyrexia in rats. Sesame oil inhibited carrageenan induced rat paw edema for anti-inflammatory activity comparable to diclofenac sodium. [94]Anti-inflammatory activity was assessed by the method described by Winter *et al*. (1962).

Anti-oxidant activity: Sesame oil exhibited decreased in lipid peroxidation by inhibiting the generation of reactive oxygen free radicals and also attenuated multiple organ failure triggered endotoxin lipopolysaccharide in rats[95]. Ethanolic extracts of white seeds possess a better anti-oxidant activity.

Anti-bacterial activity: Reduction in bacteria causing gingivitis, oil was able to kill streptococcuss, other cold bacteria.

Anti-fungal activity: Cholro sesamone, hydroxyl sesamone, 2,3 epoxy sesamone elicited anti-fungal activity against cladosporium flavum [96].

Hepato protective activity: Ethanolic extract of sesamum administered orally at 400,700mg/ kg normalized the levels of serum glutamate oxaloacetate transaminase, serum glutamate pyruate transaminase, alkaline, acid phosphatase etc

Anti-neoplastic activity: Showed that oil caused invitro inhibition of growth of malignant melanoma and proliferation of human colon cancer cells.

CONCLUSION

Herbal medicine is an integral part of the development of modern civilization. The review showed that plants like *Mimosa pudica Punica granatum*, *Embelica officinalis*, *Sesamum indicum*, *Cuminum cyminum* has been used traditionally in the treatment of various ailments, these versatile plants are the source of various types of compounds. As the global scenario is now changing towards the use of non-toxic plant product having traditional medicinal use, development of modern ayurvedic dosage form from these plants should be emphasized for the control of various diseases.

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