



**PHYTOCHEMISTRY, PHARMACOLOGY &
MEDICINAL IMPORTANCE OF CLOVE: A REVIEW**

Rajesh K.Sharma*, K.K.Jha

ISSN NO:0976-6723

Teerthanker Mahaveer College of Pharmacy Teerthanker Mahaveer University, Moradabad India

Abstract

Clove has many medicinal uses. It is used in the treatment of toothache, and for mouth and throat inflammation. Cloves have historically been used in Indian cuisine. In the north Indian cuisine, it is used in almost every sauce, mostly ground up along with other spices. Cloves possess antiseptic, antibacterial, antifungal and antiviral properties. One of the main constituents of clove oil is eugenol and exhibits broad antimicrobial activities. Cloves are well known also for their antiemetic and carminative properties. Traditionally it is used to treat flatulence, nausea and vomiting. The volatile oil of clove is highly active against a range of test microorganisms, being classified as bactericidal in nature.

Keywords: - Cloves, medicinal uses

Introduction

Clove is used as flavor in the world. *Eugenia caryophyllata* are the slightly sweet smelling dried bloom flowering buds, which are normally used as a part of, pickles and masala. The plant which makes the supernatural occurrence of nature began from the Moluccas Islands, really and widely known as flavor Island. It is the regular and the most important item found in the flavor widely. Clove buds have been found the exceptional blazing taste and aroma. They have profound very chestnut shading, important effective fragrant smell which is slightly warm, very impactful, firmly sweet and somewhat in case astringent. In India it is mostly employed as a part of all delicious fiery rich dishes. Indonesia one of the great consumers of clove utilizes a large portion of the world creation of cloves to make clove flavor cigarettes in the ratio of 1:2 (clove and tobacco respectively). In the year 2009 clove cigarettes were banned in the U. S. They are still promoted with the new name as separated clove cigars. [1]

Cloves are the well-known fragrant herb that has numerous various valuable purposes. The smell of the clove is wonderful fiery and can be utilized to make drawers and wardrobes smell pleasant. Cloves has some restorative purposes also and it tastes great in specific dishes like flavor cake. Cloves like to develop

in hot tropical atmospheres like the islands of Indonesia. The clove plant is an evergreen tree that can achieve a stature of thirty or forty feet high. The leaves of the clove are weathered textured and are secured with numerous modest sorrows. The piece of the clove that is utilized is the blossom buds of the clove. The fragrant oils have found a stimulant and aggravation impact. Cloves can expand blood flow and raise a man's temperature somewhat. The oils of the cloves have been known not and sterilize a body as it goes through the body. Clove can be utilized to advance the stream of salivation and gastric juices. Stomach torment or give relief from the gas problem which one of the mostly occurred problem of the world. The tea of clove which is made by traditional method is most beneficial to the health. The tea such made is also beneficial to the sickness and mostly used in toothache and other problems in gum and also used to make the gum healthy. It can likewise help to assuage the torment of muscle spasms and some nerve conditions. To aerate a rotten drawer or storage room you may also can put a very small quantity of cloves in a little holder. Leave the holder which is mentioned open and place it in a reason so that it won't spill. Then again it can be tied up a modest bunch of cloves in a hanky and place it in a wardrobe or drawer. The aroma of cloves is

wonderful and decent. Cloves are an exceptionally helpful herb that has numerous uses for the human body and the smell of sweat which is daily problem. It can be utilized to flavor up nourishments like a ham or cake. It may be acquired in a force structure or it may be in a dried entire bloom bud structure. It can be purchased cloves in a market in the flavor area. It is a herb. Individuals utilize the oils, dried blossom buds, leaves, and stems and some other part of it to make medication. It is mostly and very frequently utilized for agitated as an expectorant and stomach. Expectorants make it very less but effective demanding to hack up mucus. Its oil is utilized for the runs, hernia, and terrible breath. Clove and its oil are utilized for intestinal gas, sickness, and regurgitating. Clove is connected specifically to the gums (utilized topically) for toothache, for torment control amid dental work, and for an intricacy of tooth extraction called "dry attachment." In nourishments and refreshments, clove is utilized as an enhancing. In assembling, clove is utilized as a part of toothpaste, cleansers, beautifiers, fragrances, and cigarettes. Its cigarettes, additionally called kreteks, by and large contain sixty percent to eighty percent tobacco and twenty to forty percent ground clove. Eugenol, which is one of the most important chemical constituent in clove, acts like the cooling menthol to diminish the brutality of tobacco smoking. [2,3]

Table 1: Taxonomy

Kingdom	Plantae
Subkingdom	Viridiplantae
Phylum	Tracheophyta
Subphylum	Euphyllophytina
Class	Magnoliopsida
Order	Myrtales
Family	Myrtaceae
Genus	<i>Syzygium</i>
Species	<i>Aromaticum</i>

Common Names:

- Cloves
- Carophyllus
- Clovos
- Caryophyllus

Botanical names:

Eugenia caryophyllus, Syzygium aromaticum.

Biological source

Clove is obtained from the flower buds of plant Eugenia caryophyllus.

Family:-Myrtaceae

Table 2: Common Vernacular Names:

Sanskrit	Bhadrasriya
Hindi	Laung,
Malayalam	Grampu
Marathi	Luvang
Kannada	Lavanga
Tamil	Kirampu
Telgu	Devakusumamu
Bengali	Lavanga
Urdu	Laung

Origin of Clove

Cloves are the pink blossoming bud of a structure which is evergreen tree, which are dried well as per standard and mostly and frequently employed for restorative and spicing in various purposes. Indigenous to the Moluccas flavor islands of Indonesia, cloves likewise develop actually in India, Tanzania, Sri Lanka, Madagascar, the West Indies, Brazil and. With their sultry sweet sweet-smelling flavor and capable crucial oil mixes, cloves have been utilized for a long time as a wholesome zest for nourishment and a solution for an assortment of wellbeing concerns. For more than 2,000 years, both Chinese and Indian conventional drug made broad utilization of its blooms and clove oil. Arabic brokers conveyed the buds to Europe in fourth century, and in the seventh and eighth century. Europe, it turned out to be extremely famous as a restorative bloom, because of their capacity to protect nourishments, and cover the scent of inadequately kept sustenance.[6]

Description



Fig1: Clove plant



Fig 2: Clove Buds

Cloves are the fragrant dried buds of a tree likewise here and there (*Syzygium aromaticum*) utilized as a flavor as a part of practically all the cooking. The term Clove has been come from the English and the French words both designated the clove. Its tree is an evergreen tree. Which develops to a tallness going from 8 - 12m, having expansive square leaves and cheery blossoms in various gatherings of terminal bunches. The buds are at first of colour like pale shading and continuously changes to green, after which they form into a splendid red, when they are prepared for gathering. Cloves are reaped when one to five cm long, and comprise of a long calyx, and four unopened petals ending in four spreading sepals, which frame a little ball in the inside. [4]

Cultivation and Collection

Clove tree is evergreen and 10 to 20 m in tallness. The plant obliges damp, warm and equable atmosphere with very much disseminated precipitation. It is proliferated by method for seeds. The Seeds are sown in very much depleted suitable soil at a separation of around 25 cm. The plants ought to be ensured against nuisances and plant sicknesses. At first it must be shielded from daylight by developing inside a green house or by building edges around 1 meter high and covering them. As the banana leaves rot more daylight falls on the youthful seedlings and the seeds have the capacity to manage full daylight when they are around 9 months old. The seedlings when turn into 1 m high, they are transplanted into open spaces at a separation of 6 m just before the blustery season. The youthful clove trees are shielded from sun notwithstanding for a more extended period by planting banana trees in the middle. The medication can be gathered consistently beginning from 6 years of age till they are 70 years of age.

Clove buds change the shading as they develop. Toward the begin of the stormy season long greenish buds show up which change to a dazzling blushing peach shading and as the corolla blurs the calyx turns yellow and after that red. The buds are gathered amid dry climate in the month of August to December. The accumulation is done either by jumping on the tree or by utilizing a few stepping stools or with the assistance of portable stages. In a few places the trees are even beaten utilizing bamboo sticks for the gathering of the bud. The medications which are gathered are then isolated from the stalks and after that set on coconut mats for drying under sun. The buds free around 70% of its weight, though drying and change their shading to dim rosy chestnut. The dried clove is reviewed and stuffed.[2,36]

Microscopic characters

The epidermis of clove is secured with thick fingernail skin. The epidermis itself comprises of straight walled cells and expansive anomocytic stomata. The oil organ, which are ovoid and schizolysigenous are found in all parts of the medication. Phloem strands, which are separated, are once in a while found in the supple tissue. Bunch gem of calcium oxalate and little number of stone cells are found in the medication. Clove does not contain starch.

Important Nutritional Contents found in Clove

The nutritional contents of clove may vary according to climatic conditions. The dried buds of clove contains starches, settled oil, steam-unstable oil, pitches, tannins, cellulose, proteins, and mineral components. Starches embody around two-thirds of the heaviness of the zest. The dried dull and blossom buds likewise contain supplements like minerals, proteins, vitamins, and so on.[15,16]

Phytochemistry:

Active constituents

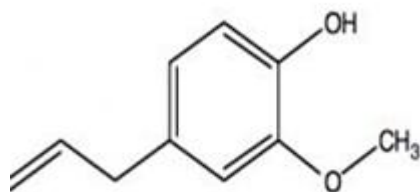
Clove contains volatile and non-volatile contents

Volatile Contents

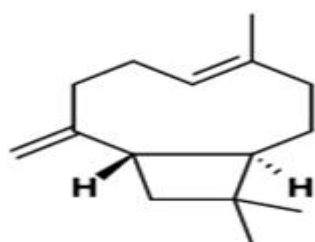
Clove may give different types of volatile oil, oil extracted from the major following parts:-

- I. leaves**
- II. stem**
- III. buds**
- IV. fruit.**

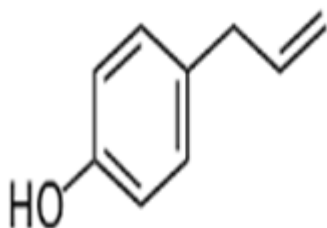
These oils may vary impressively in quality and yield. The synthesis of the oil got are affected by its inception, season, assortment and nature of crude material, development at harvest, preand post-refining medicines and strategy for refining. The boss part of the considerable number of sorts of oil is eugenol. (18)



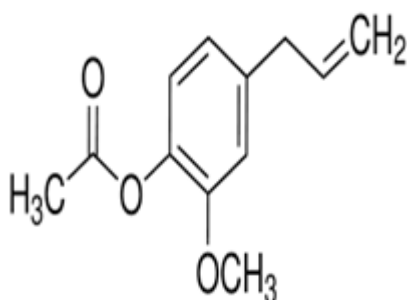
Eugenol



Caryophyllene



Chavicol



Eugenyl Acetate

Bud Oil

Great quality clove buds contain fifteen to twenty percent key oil. The oil is ruled by Eugenol (70-85%), caryophyllene (5-12%) eugenyl acetic acid derivation (15%) and, which may together make up ninety percent of the oil. The various constituents of the oil likewise incorporate benzaldehyde,-ylangene,

methylamylketone, methyl salicylate, and chavicol. The minor or the minute quantity of constituents like methylamylketone, methylsalicylate and some other, are in charge of the trademark charming scent of it. The oil from clove bud contained seventy-eighty percent eugenol and five to ten percent eugenyl acetic acid derivation, while the stem oil contained seventy six to eighty four percent eugenol and two to eight percent eugenyl acetic acid derivation. Both contained seven to twelve percent - caryophyllene and one to two -humulene 3. Pino et al. distinguished 36 mixes from the unpredictable oil of clove buds. Clove buds from India contained 12-18% oil, of which 44%-55% was eugenol, though the pedicels contained 3-7.5% oil with 60-72% eugenol.[7]

Leaf Oil

Clove leaves yield 3%-4% vital oil. The fundamental oil substance amid the distinctive phases of leaf development uncovered that the main constituent of clove (eugenol) content in the leaves expanded from 38.3% to 95.2% with development, while the substance of eugenyl acetic acid derivation and caryophyllene decreased[4]. Leaf oil contain different classes of various important chemicals, e.g. aldehydes, ketones and some class of terpenes.[19]

Stem Oil

Its stem may yields six percent oil[1]. The oil is a pale yellow to light yellow fluid containing eighty percent eugenol and seven percent - caryophyllene, other than a few minor parts. [19]

Fruit Oil

Fully ripe fruits yield two percent of oil, in which there is fifty to fifty five percent eugenol. [19]

Non-volatile Constituents

There is various or we can say that a couple of non-volatiles may have been separated from clove bud and other parts of trees, which incorporate sterols, triterpenes, tannins, and flavonoids.[16]

Tannins

Cloves contain 10 13% tannins, which have the same compound piece as gallotannic corrosive. Eugenin and ellagitannin were separated from cloves[5]. Further, two ellagitannins ,namel, syzyginin B and syzyginin A (1, 2, 3 -tri- O-galloyl 4, 6- (S) -tergalloyl-D glucoside), were likewise detached from the clears out. [2, 5, 8]

Triterpenes

It contains around two percent of the triterpene, oleanolic corrosive. Narayanan and Natu (1974) disengaged maslinic corrosive from clove buds.[7]

From clove, 2 -hydroxyoleanolic corrosive was additionally isolated. [8]

Sterols

Sterols segregated from clove incorporate stigmasterol, campesterol and sitosterol [8].

Flavonoidal contents of clove

A chromoneC-glucoside, isobiflorinand biflorin were segregated from the ethanolic concentrate of cloves[9]. Which is an important flavonoidal content of clove.

PHARMACOLOGICAL ACTIVITIES

Anti-microbial activity

Cloves speak to one of the Mother Nature s chief disinfectant. Clove oil was discovered to be more successful than sodium propionate (standard nourishment additive) against some sustenance borne microorganisms. Clove oil was discovered to be exceptionally viable against Staphylococcus species. Amongst the organisms, Aspergillusniger was discovered to be exceptionally touchy to the clove oil. Fundamental oil of clove, scattered (0. 4% v/v) in a concentrated sugar arrangement, had a germicidal impact against different microscopic organisms (S. Aureus,, Pseudomonas aeruginosa, Clostridium perfringensKlebsiellaPneumoniae, E.coli) and C andidaalbicans.[13]. Clove oil demonstrated antimicrobial movement against some human pathogenic microscopic organisms impervious to certain antibiotics[14].

Anti-viral activity

Clove is a strong antiviral operators. Eugenin detached from clove buds indicated antiviral action against Herpes Simplex infection at a convergence of 10 g/ml [16].

Chemo-preventive

Fluid implantation of Clove adequately decreased benzo[a] pyrene (BP) actuated lung carcinogenesis in strain a mice. Occurrence of dysplasia,hyperplasia and carcinoma were viably decreased and there was critical diminishment in the quantity of multiplying cells and may expanded number of apoptotic cells instigated lung injuries with the clove mixture. Oral

organization of fluid mixtures of clove at the dosage of 100 ml per mouse per day postponed the arrangement of papilloma as well as diminished the rate of papilloma and additionally the aggregate number of papillomas per mouse.[18].

Hepato-defensive action

Ethanolic concentrate of Clove demonstrated the hepatoprotective action on the paracetamol- incited liver harm. The degree of hepatic harm is evaluated by the level of expanded cytoplasmic compounds [19]. Clove concentrate restored the movement of compounds in serum towards ordinary qualities. These proteins survey the utilitarian status of the liver.[17]

Against oxidant action

Clove and Eugenol have solid cancer prevention agent movement, which is equivalent to the exercises of the manufactured cell reinforcement,Pyrogallol and BHA (butylated hydroxyl anisole)[20]. As for the lipid peroxidation, the inhibitory action of clove oil decided utilizing a linolenic corrosive emulsion framework showed a higher cancer prevention agent movement than the standard BHT (Butylated hydroxyl tolvne). It additionally demonstrated a huge inhibitory impact against hydroxyl radicals and go about as an iron chelator[21]. The metal chelating movement, bleomycin subordinate the oxidation of DNA, DPPH radical rummaging action and the ferric diminishing cell reinforcement force (FRAP) of distinctive flavors were measured in rodent liver homogenate . Cloves demonstrated the most noteworthy DPPH radical searching action & most astounding FRAP values[22]. The cancer prevention agent movement of clove bud remove and its significant smell parts, eugenol and eugenol acetic acid derivation were similar to that of the normal cell reinforcement–tocopherol[23].

Against diabetic action

Its concentrate acts like insulin in liver cells and hepatoma cells by diminishing phosphoenolpyruvatecarboxykinase (PEPCK) and glucose 6 –phosphatase (G6Pase) quality expression. Similarly like insulin, clove action suppression is triggered by PI3K inhibitors and N acetylcysteine (NAC). A more worldwide investigation of quality expression by DNA microarray examination s for

uncovered that clove and insulin directed the statement of huge numbers of the same qualities in a comparative manner [25].

Mitigating action

Eugenol, the essential part of clove's unstable oils, works as an antagonist of provocative operators. In creatures, the expansion of clove concentrate to eating regimens effectively high in hostile to incendiary segments brings a synergistic impact.

Clove likewise contains a mixture of flavonoids, including kaempferol, rhamnetin and -caryophyllene which additionally added to clove's hostile to incendiary and cancer prevention agent properties.

Hostile to platelet action

It was found that both eugenol and acetyl eugenol, (two dynamic constituents of clove) were more strong than ibuprofen in repressing platelet accumulation prompted by adrenaline, arachidonate and collagen. In arachidonate actuated collection eugenol was at standard with indometh. [27]

Anti-stress activity

The clove concentrate decreased the advancement of chilly limitation instigated gastric ulcers and kept the biochemical changes actuated by solid stretch, for example, raised plasma levels of aspartate aminotransferase, alanine aminotransferase, basic phosphatase, glucose, cholesterol and corticosterone. Clove concentrate was likewise viable in expanding the idleness of anoxic anxiety affected writhings in mice. The stimulant action of eugenol has as of now been established. [28]

Against pyretic impact

Eugenol, the boss constituent of clove oil, indicated stamped antipyretic movement when given systemically by IV or IM to rabbits. Eugenol was more successful in diminishing fever than acetaminophen. It decreased fever basically through a focal activity like that of regular antipyretic medications, for example, acetaminophen. [29]

Anaesthetic effect

Clove oil is discovered to be a distinct option for Tricaine, the main enrolled soporific for a few fish animal categories. Introduction of channel catfish (*Ictalurus punctatus*) to clove oil at the convergence of 100mg/l can bring anesthesia for 1min(30). Clove oil and eugenol were accounted for to be worthy sedative

rabbit fish (*Saiganus lineatus*), coral reef fish (*Pomacentrus amboinensis*) and rainbow trout (*Oncorhynchus mykiss*) for utilization in water society and amphibian research. It has been found that ethanolic extract of clove (50%) produced a significant and sustained increase in the sexual activity of normal male rats, without any conspicuous gastric ulceration and adverse effects [32].

Love potion

It has been found that ethanolic concentrate of clove (50%) created a noteworthy and maintained increment in the sexual action of ordinary male rats, with no prominent gastric ulceration and unfriendly effects [32].

Mosquito repellent

Clove oil has hundred percent repellency (two to four hour) against three types of mosquitoes i.e. *Culex quinquefasciatus*, *Aedes aegypti* and *Anopheles dirus* under research center conditions utilizing human subjects [8].

Insecticidal activity

Methyl eugenol and Eugenol, isoeugenol show insecticidal movement to pathogens like *Sitophilus zeamais* and *Tribolium costaneum*. The clove leaf and bud oils indicated powerful insecticidal action.

Medicinal Uses

Clove is known not for only antibacterial properties but also utilized as a part of different dental creams, tooth glues, mouth washes, and throat splashes to purify microscopic organisms. It is likewise used to remember torment from sore gums and enhances general dental wellbeing. In dentistry, eugenol in mix with zinc oxide is utilized for provisional filling of holes. Clove is an anodyne (a specialist that calms or remembers torment) for dental crises [11].

Cloves are love potion (a specialist for stirring or expanding sexual yearning or strength). Clove is utilized as a hostile to incendiary specialist, because of its high substance of flavonoids. Smell specialists use unadulterated clove oil to cure the manifestations of ailment and joint inflammation. Clove is utilized as a carminative, to increment hydrochloric corrosive in the gastrine and to increase peristalsis. It is also used to treat skin break out.

Glue of clove powder in water advances speedier recuperating of cuts and chomps. Cloves can adequately cure numerous digestive issues. It is having therapeutic qualities to cure fart, free movements, acid reflux and queasiness. These are valuable in calming the manifestations of loose bowels, gastric crabbiness and spewing.

Clove and its oil help the resistant framework by sanitizing the blood and help to battle against different sicknesses. Its oil is powerful in curing Athlete s foot and nail growth. Cloves are great expectorants that advance the release of mucous and emissions in the respiratory section. The sweet-smelling clove oil, when breathed in can help calm certain respiratory conditions like cool, hack, asthma, bronchitis, and sinusitis. It additionally helps in clearing the nasal tract. Cloves can viably keep the lung disease and also the skin malignancy. Eugenol helps in minimizing the destructive impacts of ecological squanders that can bring about malignancy of digestive framework. Clove oil invigorates blood stream and flow making it helpful for the individuals having icy limits. Cloves maintain blood glucose level in diabetic patients. Eugenolis sufficiently capable for avoiding blood clusters in human and animals. Sucking of a clove bud diminishes want for liquor. Strong spasms are regularly soothed, when the oil of clove is connected as a poultice close to the influenced range.

Scientists found that sniffing the fiery fragrance of cloves diminishes laziness, peevishness and migraines. One drop of clove oil connected to the top of the mouth can in a split second calm numerous cerebral pains. Clove upgrades memory maintenance. It is prescribed for diminishing cerebrum haze, torpidity and depressive perspective. Examination has demonstrated that clove oil is a viable mosquito repellent[12].

Veterinary Uses
These are widely utilized as a feature of a bigger home grown equation to treat bitches which are holding pups. The clove oil has been mostly used to treat outside matter in puppy and feline ears and as a painkiller to treat toothache. Peppermint tea with a sprinkle of cloves and ginger has been utilized to treat spewing in puppies; 1 tbsp or additionally, as indicated by the extent of the creature, being given 3

times day by day.[34]

Culinary Uses

Dried clove buds are the key fixing in Indian masala tea. Clove is regularly used to flavor meat items, cakes, treats, confections, mulling over gum, spiced natural products, hot spiced beverages, wines and mixers, pudding, sandwich, cake, curry, and pickles. It is a typical kitchen zest utilized for studding especially tomatoes, onions, frankfurter, soups, servings of mixed greens and natural teas. It is a vital flavor utilized as a part of cooking styles of Russia, Scandinavia, Greece, India, and China. [35]

Miscellaneous Uses

Clove is used as a flavors in various Pharmaceuticals. Clove oil is utilized to flavor tooth glues. The leaf oil is utilized to bestow aroma to aromas and cleansers. In Indonesia, cloves are blended with tobacco in 1: 2ratio to make a cigarette called Kretek. Clove is utilized to make pomanders (sensitive oranges, lemon and pieces of fruit are penetrated with an expansive needle to make openings for clove inside the concentric gaps). [32,33]

Home Remedies Using Clove

Place a clove bud between the jaws, at the site of toothache. Apply clove oil in the hole of rotted tooth. This would decrease the torment and help to enhance contamination. To uproot awful breath bite clove buds. Set up a decoction by heating up five or six cloves in 30 ml of water. Bring decoction of clove with nectar, three times a day as an expectorant. Biting a clove with salt likewise remembers hacking. It is also used in the treatment of hyperacidity. Clove oil, when brought with sugar cures stomach throb. Glue of clove and normal salt, when brought with milk helps in decreasing cerebral pain. The paste of clove powder is employed in nectar uproots sickness. Clove bud bubbled in water goes about as a hostile to emetic, especially when taken by pregnant women. For treating convulsive hacks amid tuberculosis, bronchitis and asthma, blend a couple drops of its oil with garlic and nectar. Embed into the ear two three drops of warm blend of clove oil to diminish ear issues. Apply the glue of clove powder in nectar over the influenced region to get ridoff pimple inflammation. Clove stub is rubbed in water and

apply over the affected zone for treating pen (aggravation on the eye lashes). Eating a clove in betel (flautist betel) leaf is the best solution for treating catarrh. Splashing the arrangement of clove oil in water (1:10) keeps the creepy crawlies under control. [8,10]

CONCLUSION

Clove is a medicinally important drug, reported to have a variety of different applications like antioxidant, antifungal, antiviral, antibacterial, anti-inflammatory, antithrombotic, antipyretic, analgesic, anticonvulsant, antimycotic, insecticidal, antimutagenic, antiulcerogenic etc. Eugenol is the main constituent reported to be responsible for these activities. There is a wide scope for researchers to develop efficacious formulations using clove oil. Clove is a very powerful herb medicinally with a solid traditional heritage and history. Clove has numerous health benefits. Clove has found to have an important place in pharmacognosy and also in traditional view.

REFERENCES:-

1. Parle Milind, Khanna Deepa (2011). Clove A champion Spice. *Worldwide diary of Research in Ayurveda and pharmacy*, 2(1), 47-54.
2. Pino JA, Marbot R, Aguero J, Fuentes V (2001). Key oil from buds and leaves of clove (*Syzygium aromaticum* (L.) Merr. et Perry) developed in Cuba. *Diary of Essential Oil Research*. 2001; 13(4): 278 -279.
3. Gaydou EM, Randriamiharisoa R (1987). Multidimensional examination of gas chromatographic information, application to the separation of clove bud and clove stem vital oils from Madagascar. *Perfumer and Flavorist*. 12: 45- 51.
4. Gopalakrishnan, N. and Narayanan, C.S. (1988). Composition of clove leaf oil during leaf growth. *Indian Perfumers*. 32(2): 130-132.
5. Nonaka G, Harada M, Nishioka I (1980). Eugenol, another ellagitannin from cloves. *Synthetic and Pharmacological Bulletin*. 28: 685 -687.
6. Tanaka T, Orii Y, Nonaka G, Nishioka I (1993). Tannins and related mixtures. CXXIII. Chromone, acetophenone and phenyl propanoid

glycosides and their galloyl and/or hexahydroxyphenyl esters from leaves of *Syzygium aromaticum* Merr and Perry. *Concoction Pharmaceutical Bulletin*. 28: 685 -687.

7. Narayanan CR, Natu AA (1974). Triterpene acids of Indian clove buds. *Phytochemistry*. 13(9): 1999-2000.
8. Brieskorn CH, Munzhuber K, Unger G. (1975) Crataegolsaure and steroid glukoside aus Blütenknospen von *Syzygium aromaticum*. *Phytochemistry*. 14: 2308-2309.
9. Zhang YW, Chen Y. (1997). Isobiflorin, a chromone-C-glucoside from cloves (*Eugenia caryophyllata*). *Phytochemistry*. 45: 401- 403.
10. Nassar MI. Flavonoid triglycosides from the seeds of *Syzygium aromaticum*. *Carb Research*. 2006; 341: 160 -163.
11. Cai L, CD Wu (1996) Mixtures from *Syzygium aromaticum* having development inhibitory action against oral pathogens. *J. Nat. Prod*. 59(10): 987 - 990.
12. Trongtokit Y, Rongsriyam Y, Komalamisra N, Apiwathnasorn C. (2005). Near repellency of 38 crucial oils against mosquito chomps. *Phytotherapy Research*. 19(4): 303 - 309.
13. Briozzo J, Nunez L, Chirife J, Herszage L, D Aquino M. Antimicrobial movement of clove oil scattered in a concentrated sugar arrangement. *J. Appl. Bacteriol*. 1989; 66(1): 69-75.
14. Lopez P, Sanchez C, Batle B, Nerin C. Strong and vapor stage antimicrobial exercises of six vital oils: weakness of those nourishment borne bacterial and contagious strains. *Diary of Agriculture and Food Chemistry*. 2005; 53: 6338- 6346.
15. Pinto E, Valer-Silva L, Cavaleiro C, Salgueiro E. Antifungal action of clove crucial oil from *Syzygium aromaticum* on *Candida aspergillus* and dermatophyte species. 2009; 58: 1454 - 1462.
16. Chaieb K, Hajlaoui H, Zmantar T, Kahla-Nakbi, A.B., Rouabhia, M., Mahdouani, K. furthermore, Bakhrouf, A. (2007). The concoction structure and natural action of crucial oil, *Eugenia Caryophyllata* (*Syzygium aromaticum* L. Myrtaceae) : a short survey *Phytotherapy Research*. 21(6): 501 - 506.
17. Banerjee S, Panda KC, Das, S. Clove (*Syzygium aromaticum* L.) A potential 27. Srivastva

- Chemopreventive operators for lung disease. *Carcinogenesis*. 2006; 27(8):1645 - 1654.
18. Banerjee S, Das, S. Anticarcinogenic impacts of a watery implantation of cloves on skin carcinogenesis. *Asian Pac J. Disease Prev*. 2005; 6(3): 304 - 308.
19. Sallie R, Tredger JM, William R. Drugs and the liver. *Biopharmaceutics and drug aura*. 1991 ; 12: 251 - 259.
20. Dorman HJD, Surai D, Deans SG. In vitro cancer prevention agent movement of various plant vital oils and Phytoconstituents . *Diary of Essential Oil Research* .2000; 12: 241- 248.
21. Gulcin I, Sat IG, Beydemir S, Elmastas M, Kufrevioglu OI(2004). Correlation of cell reinforcement activity of clove (*Eugenia caryophyllata* Thunb) buds and lavender (*Lavandulastoechas* L.). *Sustenance Chemistry*. 87: 393 - 400.
22. Yadav AS, Bhatnagar D.(2007). Free radical rummaging action, metal chelation and cancer prevention agent force of some Indian flavors. *Biofactors*. 31(3 - 4): 219-227.
23. Lee KG, Shibamoto T(2001). Cancer prevention agent property of smell concentrate secluded from clove buds [*Syzygium aromaticum* (L.) Merr. et Perry] . *Nourishment Chemistry*. 74(4): 443 -448.
24. Raghavenra H, Diwakar BT, Lokesh BR, Naidu KA(2006). Eugenol, the dynamic standard from cloves hinders 5 - lipoxygenase action and leukotriene - C₄ in human PMNL cells. *Prostaglandins, Leukotrienes and Essential Fatty Acids*.;74: 23- 27.
25. Prasad RC, Herzog B, Boone B, Sims L, Waltner-Law L(2005). A concentrate of *Syzygium aromaticum* curbs qualities encoding hepatic gluconeogenic proteins. *J Ethnopharmacol*. 96(1 - 2):295 - 301.
26. Ghelardini C, Galeotti N, Di Cesare Mannelli L, Mazzanti G, Bartolini A(2001) . Nearby sedative action of - caryophyllene 11. *Farmaco*.; 56: 387- 389.
- KC. Antiplatelet standards from a nourishment flavor clove (*Syzygium aromaticum* L). *Prostaglandins LeukotEssent Fatty Acids* . 1993; 48(5):363 - 72.
28. Singh AK, Dhamanigi SS, Asad M.(2009) Against - stress action of hydro-alcoholic concentrate of *Eugenia caryophyllus* buds (clove). *Indian J. Pharmacol*. 41 : 28 - 31
29. Feng J, Lipton JM.(1987). Eugenol: Antipyretic action in rabbits. *Neuropharmacology*.; 26: 1775- 1778.
30. Waterstrat PR.(1999). Instigation and recuperation from anesthesia in channel catfish *Ictalurus punctatus* fingerlings presented to clove oil. *Diary of the World Aquaculture Society*. 30: 250 - 255.
31. Keene JL, Noakes DLG, Moccia RD, Soto CG (1998). The adequacy of clove oil as a soporific for rainbow trout, *Oncorhynchus mykiss* (Walbaum). *Aquaculture Research*. 29(2): 89 101.
32. Tajuddin, Ahmed S, Latif A, Qasmi IA(2004). Impact of half ethanolic concentrate of *Syzygium aromaticum* (L.) Merr. & Perry. Clove on sexual conduct of typical male rats. *BMC Complement Altern. Med*. 4: 17.
33. Yang YC, Lee SH, Clark JM, Ahn YJ. (2003). Insecticidal action of plant vital oils against *Pediculus humanus capitis* (Anoplura: Pediculidae). *Diary of Medical Entomology* .41: 699 -704.
34. *Diary of Pharmacognosy and Phytochemistry* Vol. 1 No. 1 2012 www.phytojournal.com Page | 13 Recent Trends in Indian Traditional Herbs *Syzygium aromaticum* and its Health Benefits.
35. Shah & Seth. Course book of Pharmacognosy and Phytochemistry. Elsevier production First Edition 2010, pp 306.
36. Kokate C.K., Purohit A.P., Gokhale S.B. Text book of Pharmacognosy. Nirali Prakashan Pune, 47th edition 3.8-3.9.

Correspondence Address:

Rajesh K. Sharma

Assistant Professor

Teerthanker Mahaveer College of Pharmacy

Teerthanker Mahaveer University, Moradabad India

E-mail- rajeshsharma7529@gmail.com

Phone: +91-9452248988