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## Enhancing the flavour of oil by Infusion of different herbs-review

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**Abstract**

Herbs are rich in volatile compound which increase aroma and shelf life of food product. Oregano scientifically known as *Origanum vulgare* very beneficial for the health. Mostly *Origanum vulgare* is used to treat different types of diseases and ailments. Oregano is effective against diseases like diabetes, anti-bacterial, anti-fungal and many more activities. *Syzygium aromaticum* is the scientific name used for clove which is also refer as champion of antioxidant till known. Eugenol is the major constituent who is responsible for the medicinal property of clove. Once infused, these different composition of clove, oregano and cinnamon show different properties of oil when infused with olive oil. Infusion involves immersing oregano, cinnamon and clove in oil to extract their flavours. Store the infused oils at room temperature and preservation of the oils will maintain their fresh flavour for a long time. *Cinnamum cassia* is the scientific name for cinnamon it is mainly isolated from the bark of tree and is also used as a spice, it also used for the traditional medicinal method which have antioxidant activity which prevent the food from spoilage. It is also used as a curable medicine for anti diabetic and anti cancer diseases. The delicate and unique taste of olive oil is contributed to the volatile substances that developed during & after the oil isolated from olive fruits. Olive oil have higher content of monounsaturated fatty acid.

**Keywords:** Infusion, olive oil, oregano, clove, cinnamon

**Introduction**

Olive is a useful food which has higher content of monounsaturated fatty acid (MUFA). It also contains various minor components such as tocopherols, phenolic compounds, aromatic compounds. Olive oil has cardio protective effects and is consumed in the Mediterranean diet and contributes to its higher MUFA content. Oleic acid being a main fatty acid is highly intake through mammal food for example pork & poultry in Western diet (Linseisen J, *et al.*, 2002)<sup>[47]</sup>. The important component of olive oil depending on the climate, the processing system employed, cultivation and ripeness of the olives at the time of harvesting. Ordinary, Pomace or virgin olive oil is produced by different processing method (Gimeno E, *et al.*, 2002)<sup>[22]</sup>. The olive is directly pressed or centrifuged to produce virgin olive oil. Virgin olive oils has acidity > than 3°. When subjected to a refining process, some compounds mostly phenolic components are lost. The combination of virgin and refined olive oil leads to the formation of an ordinary olive oil (Owen RW, *et al.*, 2000)<sup>[61, 62, 63]</sup>.

The perennial herb belong to mint family (Lamiaceae) is a members of subdivision *Origanum* L. widely spread in the Mediterranean, Europe, Siberian and Iran in the Siberian region, the family has been distinguish into 10 sections including 3 varieties, 18 naturally occurring hybrids, 43 species, 6 subspecies (Letswaart, 1980; Kintzios, 2002; Sahin *et al.*, 2004). Mainly dispersed in the Mediterranean region, 75% of the members of the family are confined to East Mediterranean (Skuola *et al.*, 2004). From subtropical to alpine zones of Indian Himalayan region, only one species is present in India (Mukerjee, 1940). In European Countries *Origanum vulgare* is usually called as 'Oregano' and in India it is called as 'Indian Oregano' or 'Himalayan Marjoram'. Establish between an altitude of 600 to 4000 m ASL of Garwhal & Kumaon Region of Uttarakhand Himalaya, it is the only species reported from North-Western Himalaya (Samant *et al.*, 1998). The fragrance of aromatic plant is due to the volatile secondary metabolites. Phenolic characters constituted the existence of major chemical components, carvacrol and thymol in the essential oil of *O. vulgare*. The species have been used in medicine and species due to considerable amount of these major chemical components in the essential oil of the plants, it is used in perfumes, cosmetic products & as drugs due to its thyme like flavour (Fleischer and sneer, 1982).

In the Myrtaceae family clove is the aromatic dried flower buds of a tree (Srivastava & Malhotra, 1991; Chaieb *et al.*, 2007a). In Ayurveda, Chinese medicine and Western herbalism clove are used. Clove can be used as a carminative as it helps to recover from peristalsis and brings an increment in the HCl level in stomach (Phyllis & James, 2000). For the treatment of dental problem essential oil is used as anodyne (Cai & Wu, 1996; Prashar *et al.*, 2006). Since ancient time in India clove has been used as a culinary spice. Clove oil mainly used in many toothpaste and mouthwashes as ingredient. Clove, aevergreen aromatic medicinal plant and a major plant used in cooking with vast therapeutic effect. They are commonly consumed as a spice and is a local plant in Indonesia. Clove are primarily produced in Indonesia, India, Madagascar, Zanzibar, Pakistan, Sri Lanka- and the largest part of clove is produced by Pemba Island. (Baliga MS, Rao S., 2010).

Cinnamon bark is the most major and popular spices which is mainly used in traditional and modern medicines. Cinnamon commonly used as a condiment & agent for flavouring, because of its mouth freshening ability and capacity to eliminate bad odour, cinnamon is added to flavour chewing gums (Jakhetia V *et al.*, 2010) [33]. Cinnamon can prevent the bleeding by acting as a coagulant (Hosseini N *et al.*, 2013). It is beneficial for oral problems and prevent dental infections, toothaches & for removing bad odour (Chaudhary S.S., *et al.*, 2013). Cinnamon is also utilized to heal various disorders like inflammatory, urinary and gastrointestinal disorders (Brierly, S.M., Kelber, O., 2011; Al-Jiffri, O. *et al.*, 2011).

### Health benefits

For dropsy, narcotic poisons and convulsions the oregano herb is used as a remedy (Kaul VK, *et al.*, 1996) [39]. Both leaf extract and oregano essential oil has high antibacterial agent because of the high concentration of thymol in it (Vagi E, *et al.*, 2005) [73]. The air dried leaves is utilized in painful swellings and rheumatoid. Oregano tea have antiseptic ability which is basically used for treating cold, menstrual pain and fevers (Sezik E, *et al.*, 1993) [70]. The oregano stimulated the bile flow and the herb also helps in reduce the discomfort of flatulence and more abdominal gas (Nowak R, *et al.*, 2013) [60]. Oregano oil used for curing different kind of joint pain and toothaches. For toxic bites of snakes and insects as an antitoxin the oregano was alkoused (Picq M, *et al.*, 1991) [64]. Cinnamon used as an flavouring agent because of its mouth refreshing ability and for removing bad breath (V. Jakhetia, *et al.*, 2010) [33]. In the advances tissue and uterine reformulation cinnamon is used to enhance the blood circulation (St. Minich and L. Msom, 2008) [57]. Cinnamon oil also have major activities, such as antifungal, antioxidant, antidiabetic, antioxidant, antitermitic, anticancer agent, anti-inflammatory, antimycotic, nematocidal, insecticidal, and mosquito larvicidal. To treat dental problems, toothaches & oral microbiota cinnamon is used and also utilized in toothpowder (K. Aneja, *et al.*, 2009; C. Gupta, *et al.*, 2011) [6, 24].

The benefits of clove such as antifungal, antioxidant insecticidal and antibacterial activities. Clove is used as an antiseptic in oral infections (Meeker H.G *et al.*, 1998; Shapiro S *et al.*, 1994). Clove oil is used rubefacient, carminative and as a preservatives, signified possible antimicrobial properties (Odugbemi, 2006).

### Chemical composition

In olive oil the vitamin E present is  $\alpha$ -tocopherol which range

from level 1.2 to 43mg /100g. The quantity of olive oil in one tablespoon contains 1.9 mg of tocopherol, which is 10 % of the DV of this nutrient according to 2,000-calorie diet. Obviously, the quantity of these molecules available in the oil is a role of several factors. (Kiritsakis A, Markakis P, 1998; Gutierrez F, *et al.*, 1999; Psomiadou E, *et al.*, 2000) [42, 15, 65].

The pulp of the olive contain phenolic substances, which are found in the oil. The phenolic class includes a varieties of substances, include simple phenol compounds like monohydroxy benzoic acid, trihydroxy benzoic acid, hydroxycinnamic acid, caffeic acid, tyrosol and hydroxytyrosol. These primary phenol compounds are found at a concentration of 4.2mg/100gram in extra virgin olive oil and 0.47mg/100gm in refined oil. olive oil consist of secoiridoids such as oleuropein and ligitroside (respectively 2.8mg/100gm in extra virgin oil & 0.93mg/100g in refined oil), or some more compounds like lignans (4.15mg/100g in extravirgin oil & 0.73mg/100g in refined oil) and bioflavonoids such as pigenin or luteolin (Owen R, *et al.*, 2000) [61, 62, 63].

It is evaluated that more than seventy substances provided to the particular flavour or fragrance of olive oil. These involve degeneration products of unsaturated fatty acids like aldehydes (mainly inhexanal, 2, 4-decadienal or 1-hexanol and nonanal). Additionally, ring and chain hydrocarbons, ketones, OH groups, esthers, ethers, thioterpene & furans derived compounds significantly effect the flavour and odour of oil (Kiritsakis A, Markakis P, 1998) [42].

In cinnamon (*C. zeylanicum*) the main substance identified and isolated is classified in two chemical group: volatile phenols and polyphenols. Along with polyphenols, cinnamon consist mainly caffeic, ferulic acids, protocatechuic, gallic, p-coumaric, and vanillic (Muchuweti, M *et al.*, 2007) [58]. The constituents of cinnamon oils relies upon the component of plants through which they were isolated, with respect to volatile components. In essential oil of bark, cinnamaldehyde is the most available component, with a concentration range of 90% to 62%-73%, which depend on the method of isolation, this was more for vapour distillation as compare to Soxhlet method (Wong, Y.C., *et al.*, 2014) [77]. Oxygenated and hydrocarbons substances (i.e.,  $\beta$ -caryophyllene, eugenyl acetate, linalool, benzyl benzoate and cinnamyl acetate) are the another minor volatile compound. In essential oil of cinnamon leaf, the important compound is eugenol which extend a concentration of higher than 80%. From cinnamon fruit and flowers the essential oil is extracted, caryophyllene and (E)-cinnamyl acetate are the important components (Jayaprakasha, G.K. *et al.*, 1997; Filoche, S.K. *et al.*, 2005) [36, 18].

clove is rich in phenolic components like hydroxy benzoic acids, hydroxyphenyl propens, coumaric acid, and flavonoids are represented by clove. Eugenol is the major bioactive substance in clove, which range in amount from 9 381.70 to 14 650.00 mg per 100 g of plant material (Neveu V, *et al.*, 2009). As compared to phenol carboxylic acid, trihydroxybenzoic acid is present in large amount (783.50 milligram/100gram fresh weight). Other derivatives trihydroxybenzoic acid found in large amount (2 375.8 mg/100 g) are hidrolizable tannins (Shan B, *et al.*, 2005) [12]. Caffeic, elagic and salicylic and ferulic acid are another phenolic acid present in clove. In less concentrations clove also constituent Flavonoids as quercetin, kaempferol and its derivatives (glycosilated) are present in the clove in less amount. In flower buds of clove upto 18% concentrations of clove oil could be present. clove oil mainly consist of 5-15 percent is

eugenol acetate and 5% eugenol and  $\beta$ -caryophyllene (Jirovetz L, *et al.*, 2006). An additional major substance present in the clove oil in amount up to 2.1 percent is  $\alpha$ -humulene. Ethylhexanoate, benzaldehyde, farnesol, limonene, 2-heptanone and  $\beta$ -pinene are another volatile compounds found in less concentration in essential clove oil.

#### Antioxidant activity

The antioxidants in our body act as natural defence system and neutralise the free radicals that cause damage to the body. Various plant constituents have antioxidant properties that are safe and effective remedy for diseases control. The process of carcinogenesis could be delayed or even reversed using antioxidant approaches (Tsao AS, *et al.*, 2004; Shureiqi I, *et al.*, 2000). *Origanum vulgare* was investigated for its *in vitro* oxidation preventive activity using warm water, ethanol and freezing water extracts in DPPH & FRAP assay. According to DPPH assay, the most powerful effect was shown by warm water isolate followed by cold water isolate and ethanol isolate (Teixeria B., *et al.*, 2013).

When compared with the antioxidant activities of BHA (butylated hydroxy anisole) and Pyrogallol, clove and eugenol possess significantly higher antioxidant activity (Dorman HJD, *et al.*, 2000). Clove has the highest capacity to reduce lipid peroxidation by releasing hydrogen. It also has an inhibitory effect on hydroxide ion and act as chelating agent against iron. (Gulcin I, *et al.*, 2004). A research by Yadav AS, Bhatnagar D., (2007) revealed that the cloves have the maximum DPPH radical scavenging activity and FRAP values out of different spices in metal chelating activity. In another research Lee KG, Shibamoto T., 2001; Raghavenra H, *et al.*, (2006) shown that a main aroma compound of clove - Eugenol inhibited the activity of 5- lipoxygenase and leukotriene C-4 in human PMNL cells. The antioxidant action of clove bud extract and eugenol acetate were similar to the tocopherol which is a natural antioxidant. The antioxidant substance found in foodstuff are important in human diet and act as health protecting agents.

Antioxidant are used in the food processing industry in order to delaying or preventing their contaminations. Medicinal plants & spices has achieved a faster contemplation as origin of useful antioxidants effective against several diseases (M. Suhaj, 2006) [71]. Antioxidants respond to free radicals, break the cells in case of metabolic disorder & age related symptoms in humans & other animals and thus are considered a major driver in human progress (B. Halliwell, 2011; 2006) [26]. Mancini- Filho *et al.* reported that methanolic, ether and aqueous extracts cinnamon, show considerable antioxidant activities (J. Mancini-Filho, *et al.*, 1998) [51]. A report from research group stated that cinnamon oil has the capacity to inhibit pyrogallol autoxidation and thus potentially exhibits superoxide- dismutase- (SOD-) like activity (S.J. Kim, *et al.*, 1995) [40].

The existence of primary phenols like phenylethanoid, polyphenols like demethyloleuropein and other compound such as secoiridoids (SID), the dialdehydic form of oleuropein (SID-1) in olive fruits, oils & leaves make them important in the treatment of several diseases. Investigations have proved that *ex vivo* & *in vitro* models of olive oil phenols has show greater antioxidant activity than tocopherol in case of triglyceride of fatty acid & deoxyribonucleic acid oxidation (Owen RW, *et al.*, 2000; Fito M, *et al.*, 2000; Masella R, *et al.*, 2004; De la Puerta R, *et al.*, 1999) [61, 62, 63, 54, 15].

#### Anti-Inflammatory activity

The anti-inflammatory activity of *Origanum vulgare* was evaluated by using Methanolic Leaf extract at a dose of (1.5, 2.25 and 2.7 mg/ml). Through inhibition of iNOS anti-inflammatory property on the activated mixed & microglial cells showed by leaf extract (Javadian S, *et al.*, 2016) [35].

Eugenol, a primary component of volatile oil in clove has an anti- inflammatory action. A variety of flavonoids present in clove, including rhamnetin, Kaempferol and beta caryophyllene show its anti-inflammatory & antioxidant properties (Ghelardini C, *et al.*, 2001).

The anti- inflammatory activities of cinnamon have been indicated through several research conducted on therapeutic plants & its constituents (J. Lin, *et al.*, 1999; E. N. Matu & J. vanstaden, 2003) [46]. There are various isolated flavonoid substance such as gnaphalin, hesperidin, hibifolin, hypolaetin, gossypin, Oroxindin and quercetin that has anti- inflammatory activities (A. Garcia- Lafuente, *et al.*, 2009; N. Cho, *et al.*, 2013) [9, 13]. The significant anti-inflammatory property showed in the ethanolic extract of *C. cassiaby* decreasing the activation of Src/spleen- tyrosine- kinase- (Src/Syk-) mediated NF-KB (T. Yu, *et al.*, 2012; H. S. Youn, *et al.*, 2008) [79, 78].

The anti-inflammatory properties of olives & their constituents such as Oleocanthal, a phenolic composite of virgin olive oil have been proved to show anti- inflammatory properties similar to NSAID ibuprofen (Lucas L, *et al.*, 2011) [50]. Oleocanthal, is an prohibitor of the cyclooxygenase-1 and cyclooxygenase-2 enzymes but it is not very efficient in the control of 5-LOX enzyme. Another enzyme that plays the main role in inflammatory is LOX enzyme. The constituents Oleocanthal this can be countered by other constituents that play a role in inhibition of lipoxygenase. Another report by De la Puerta R, *et al.*, (1999) [15] shows that, oleuropein inhibits LOX enzyme activity and the production of LeukotrieneB4.

#### Antifungal activity

The inhibitory effect of extract of oregano on *Aspergillus* spp. growth and on STC biosynthesis was studied by (Suncica Kocic-Tanackov *et al.*, 2012) [59] with the help of yeast extract sucrose and AGAR plate broth method. Antifungal potential of extract of oregano showed by the increased concentration (0.2 and 2.5 ml/dl) (Adam K *et al.*, 1998) [2].

Antifungal action of essential clove oil and eugenol were used in food industry. Products can be contaminated with microorganisms during harvesting, technological process and storage of food. Since ancient times, in order to prevent the fungi gaped growth and spices were used, they also including cloves (Maryam Omidbeygi, Mohsen Barzegar, 2007) [53]. Effects of oil on *Aspergillus flavus* (a kind of widespread fungi) which may produce potentially carcinogenic aflatoxin, has been studied. The medium was the tomato purée. Researches have reported that by use of oil in quantities necessary to achieve the antifungal effect has a bad influence on the organoleptic properties of tomato puree (taste). This disadvantage can be avoided by applying oil to products with a strong taste that camouflage a clove flavor or adding only the active ingredients of essential clove oil (Stepien M., *et al.*, 2007). Fungus *Penicillium Citrinum* may produce mycotoxins (citrinin) causing kidney damage and bleeding (Vazquez B.I., *et al.*, 2001). Citrate may appear in dairy products. Therefore, oil and eugenol was tested to inhibit the growth of *Penicillium*

Citrinum, during the processing of regional cheese manufactured in the Spanish province of Galicia from unpasteurized milk in presence of animal rennet (Venarsky M.P., Wilhelm F.M., 2006) [74].

#### Antimicrobial Activity

Clove is utilized as an antiseptic. Against some food borne microbes, clove oil is considered more effective than sodium propionate (standard food preservative). Clove oil is more effective against *Staphylococcus* species. It was found that *Aspergillus niger* is extremely sensitive to the clove oil. In the concentrated sugar syrup (0.4% v/v) the clove oil dispersed and had a germicidal action against different microbes (*S. Aureus*, *E. coli*, *Klebsiella Pneumoniae*, *Clostridium perfringens*, *Pseudomonas aeruginosa*) and *Candida albicans* (Briozzo J, *et al.*, 1989). In Dr Huda Clark's procedure clove is used for the removal of the parasites from the gastrointestinal. It have been noted that to kill *Bacillus tuberculosis* 0.05% solution of eugenol is sufficient (Lopez P, *et al.*, 2005). The antimicrobial property of clove has been proved against various fungal & bacterial strains. Sofia *et al.* tested that the antimicrobial action of several Indian spices like cinnamon, mint, mustard, garlic, clove & ginger. The only sample that has shown whole bactericidal antibiotics effects against the various food-borne microorganism. The clove aqueous extract at 3% was reported *Bacillus cereus*, *Staphylococcus aureus* and *Escherichia coli* (*E. coli*). At the amount of 1 percent extracted clove also show better inhibitory activity.

In many studies, several antimicrobial properties of cinnamon oil and cinnamon has been reported. The antibacterial properties of gram- negative bacteria (*Salmonella cholerae suis*, *Pseudomonas aeruginosa*, *Yersinia enterocolitidis* & *Escherichia coli*) and gram-positive bacteria (*Bacillus cereus*, *Staphylococcus aureus*, *Listeria monocytogenes* and *Enterococcus faecalis*) is a mixture of *Syzygium aromaticum* & *Cinnamomum verum* was described (P. Goni, *et al.*, 2009) [23]. The cinnamon oil is more helpful than other extracts of plant, like *Azadirachta indica* and *Syzygium aromaticum* against oral microflora (H. Parthasarathy and S. Thom bare, 2013).

Another report of extract of olive leaves act as an antimicrobial agent where all examine bacteria was inactivated within the 3 hours with the dose/ amount of 0.6 percent (w/v) water extract but fungus was inhibit through other dose of 1.25 percent (w/v) plant extract a three day exposure (Markin D, *et al.*, 2003) [52]. The main research reported that Virgin olive oil has an protective effect against foodborne pathogens. The olive oil decrease the count of inoculated *Salmonella enteritidis* and *Listeria monocytogenes* through approximately three log CFU/gram in mannose & salad (Medina E, *et al.*, 2007) [56, 67]. *Campylobacter pylori* effects are stomach cancer and gastric tumour (Romero C, *et al.*, 2007) [56, 67]. An interesting research shows the antimicrobial property of olive oil against the Gram-negative bacteria *Campylobacter pylori* (Cavallaro L, *et al.*, 2006).

#### Antidiabetic Activity

A. Lemhadri *et al.* (2004) [45] reported that the anti-hyperglycaemic action of oregano India Betic rats, which introduce through STZ (65 mg/kg i.v.). Aqueous extract of *Origanum vulgare* with dose of (20 milligram/kilogram p.o.) showed its blood sugar lowering activity (Lemhadri A, *et al.*, 2004) [45].

Broadhurst *et al.* compared forty nine herbs, medicinal plant & spices extracts for their insulin-like or insulin-potentiating act in an *in vitro* model (C.L. Broadhurst, *et al.*, 2000). The cinnamon aqueous extracts increase insulin action more than twenty fold, stronger than other substances, examine at a equivalent dilution *in vitro* in the visceral fat. Extract of *Cinnamomum verum* shown to develop the insulin receptor function through activated enzyme that effect insulin to join with the cells (insulin-receptor-kinase) & inhibit the enzyme that stops this method (insulin-receptor-phosphatase), lead to the maximum phosphorylation of insulin receptor, which is related with increase insulin sensitivity (J. Imparl-Radosevich, *et al.*, 1998) [32]. In hydroxychalcone, Methylhydroxychalcone polymer (MHCP) is the pure polymer which has the ability to stimulate sugar oxidation (K. J. Jarvill-Taylor, *et al.*, 2001; R.A. Andersom *et al.*, 2006) [34]. Anderson *et al.* characterized & isolated the polyphenol type-A polymers from *Cinnamomum verum* has tested that these compounds operate as an insulin such as molecules (R. A. Anderson, *et al.*, 2004) [4]. Following this characterized, a recent substances from hydroxycinnamates like dihydroxyhydrocinnamic acid, which has blood sugar-lowering action, have been recognized (S.H. Kim, *et al.*, 2006) [41].

Earlier studies tested that, based on *in-vitro* & *in-vivo* research olive leaves, oil & seed shown a main properties to control the high blood sugar level. Another studies has showed that, Arab traditional drug, with olive leafs, was efficient in managing blood sugar in patients with high blood sugar level (Huseini HF, *et al.*, 2006; Said O, *et al.*, 2008) [30, 68]. Polyphenols of Olive leaves play a main role in suspending the sequence of AGEs (advanced glycation end products) mediate inflammatory disease like high blood sugar level (Chandler D, *et al.*, 2010) [12]. A research reported that Olive leafs control the elevation of blood sugar after oral management of starch in borderline volunteers (Komaki E, *et al.*, 2003) [43]. Research has tested that diabetic animals isolated with extracts of olive leaves shown significantly reduced in cholesterol and blood sugar (Al-Azzawie HF, *et al.*, 2006; Jemai H, *et al.*, 2009) [3, 37].

#### Anti-Cancer Activity

Peter Kubatka *et al.* (2016) [44] Research the anti-tumour property of *Origanum vulgare in vitro* and *in vivo*. Induced of carcinogen in rats through N-nitroso-N-methylure. *Origanum* oral administration with the dose of (3 and 30 g/kg). According to outcomes, tumour suppresses the activity of *Origanum vulgare* in the breast tumour that have been observed first time (Kubatka P, *et al.*, 2017) [44].

The fraction and aqueous extracts of *Cinnamomum verum* (Procyanidins) from high performance liquid chromatography inhibited the vascular endothelial growth factor of subtype 2 (VEGFR2) kinase properties, thus inhibit the angiogenesis which is drawn in cancer. Outcomes of the research shown that in cancer prevention *Cinnamomum verum* can be used significantly (J. Lu, *et al.*, 2010). Cinnamaldehyde shows inhibitors action against angiogenesis (B.-M. Kwon, *et al.*, 1997) [36]. Jeong *et al.* studied that CB403, a compound that may be synthesize from 2'-hydroxycinnamaldehyde and isolated from cinnamaldehyde, can reduce the development of tumour. Generally, the growth inhibitory & antitumor activities of CB403 in mammal base reported and in cell culture base research show the potential of *Cinnamomum verum* may used as an anticancer agent (H. -W. Jeong, *et al.*,

2003) [38]. A research in cardamom & cinnamon against Azoxymethane-(AOM-) induced colon tumour in Swiss albino mice have been tested (S. Bhattacharjee, *et al.*, 2007) [8]. Treating with the cinnamon and cardamom extract add the properties of the detoxifying and antioxidant enzyme like glutathione-s-transferase (GST) with the simultaneous decrease in lipid peroxidation range in animals with the colon tumour in compare to control (S. Bhattacharjee, *et al.*, 2007) [8]. The cinnamon oils produce from *C. cassia* slow down the  $\alpha$ melanocyte-stimulating hormone's induce melanin production, thus suppress oxidative stress in murine B16 melanoma cells (S.T. Chou, *et al.*, 2013) [14].

Olive oil is a source of polyphenols & antioxidants and plays a role to encourage better health (Wahle KW, *et al.*, 2004) [76] and also shown a role in preventing cancer. Olive oil shown a role in preventing the development of carcinomas & olive oil and carcinomas can have chemo preventive activity against colon carcinogenesis (Gill Cl, *et al.*, 2005; Bartoli R, *et al.*, 2000; Reddy BS, *et al.*, 1984; Schwartz B, *et al.*, 2004) [21, 7, 66, 79]. Earlier studies have reported that, linolenic and oleic acid shown a proliferation inhibition effects on the prostate carcinoma cells (Liu J, *et al.*, 2009; Hughes-Fulford M, *et al.*, 2001) [48, 29]. Oleuropein as a powerful anti-angiogenic and antioxidant agent and shown a potential cancer-protective effects and anti- tumor effects (Hamdi HK, *et al.*, 2005) [28]. Another studies has reported that oleuropein Showna function in inhibiting the cell propagation via inhibit the cell cycle at the up-regulation of cyclin-dependent inhibitor p21 and S phase (Elamin MH, *et al.*, 2013) [17].

#### Antiviral Activity

The antiviral activity of Eugeniin, a component extracted from *Geumja ponicum* and from *S. aromaticum*, was examine against herpes virus strains being effective at 5 $\mu$ g/ml. Ithas reported that one of the important target of the eugeniinis vital Deoxyribonucleic acid synthesis which is affected by inhibiting the viral Deoxyribonucleic acid polymerase. In other research, aqueous extracts of *S. aromaticum* (L.) Merr. *et al.*, Perry and some several plants species like *Geum japonicum* Thunb., *Rhus javanica* L., and *Terminalia chebula* Retz in combination with acyclovir showed strong activity of anti herpes virus type 1 (HSV-1). This synergic properties was not toxic to mice and was found to be stronger in the brain than in the skin (Kurokawa M, *et al.*, 1995) [41].

A *Cinnamomum cassia* bark extract was strongly effective against HIV-1 and HIV-2 replication in term of hesitancy of virus- induced cytopathogenicity. Another research work found that the *Cinnamomum cassia* bark extract could inhibit the HIV infected virus-induced cytopathogenicity in MT-4 cells and thus proved to be highly effective against the HIV-1 and HIV-2 replication (Premanathan *et al.*, 2000). Cinnamaldehyde from *Cinnamomum cassia* bark shows inhibitory action against influenza A/PR/8 virus (Hayashi *et al.*, 2007).

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