World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 4.223

# NICE HOLISTIC FLORA ALLSPICE NEEDS NOT TO PAY MUCH MORE PRICE IN SPICE

**[1*]Prof. Dr. Badmanaban R., [1]Prof. Dr. David Banji, [2]Prof. Dr. Dhrubo Jyoti Sen and [1]Mr. Goutham Retheesh**

[1]Department of Pharmacognosy, Nirmala College of Pharmacy, Kerala University of Health Sciences: Thrissur, Muvattupuzha, P.O. Ernakulum, Dist. Kerala-686661, India.
[2]Department of Pharmaceutical Chemistry, Shri Sarvajanik Pharmacy College, Gujarat Technological University, Arvind Baug, Mehsana-384001, Gujarat, India.

***Corresponding Author: Prof. Dr. Badmanaban Ramalingam**
Department of Pharmaceutical Chemistry, Shri Sarvajanik Pharmacy College, Gujarat Technological University, Arvind Baug, Mehsana-384001, Gujarat, India.

**Article Received on 10/11/2017** **Article Revised on 01/12/2017** **Article Accepted on 22/12/2017**

## ABSTRACT

*Allspice is pungent and fragrant. It is not a blend of "all spices," but its taste and aroma remind many people of a mix of cloves, cinnamon, and nutmeg. Christopher Columbus discovered Allspice in the Caribbean. Although he was seeking pepper, he had never actually seen real pepper and he thought Allspice was it. Allspice trees are evergreen medium sized, grow up to a height of 8-10 meters and with a slender upright trunk and smooth greyish bark. The mail trees produce only few fruits. The male and female trees are similar in appearance and cannot be identified till flowering commences. The tree is indigenous to West Indies (Jamaica) but is also found in Central America. Attempts to introduce into countries in tropical regions didn't succeed fully. In India, there are few trees in Maharashtra, Tamil Nadu, Karnataka and Kerala. The dried berries range in size (6.5-9.5 mm in diameter) and there are 13-14 berries per gram. The quality of pimento is affected by factors like growing area, stage of maturity of berries at harvest and storage conditions. The major use of allspice is in food industry (65-70%) in domestic use (5%-10%), production of berry oil (20-25%), extraction of oleoresin (1-2%) and pharmaceutical and perfume industry. Berry, berry oil, oleoresin, leaf oil are products of economic use. It is used mostly in Western cooking and less suitable for Eastern cooking. It has medicinal, anti-microbial, insecticidal, nematocidal, anti-oxidant and deodorant properties.*

**KEYWORDS:** Berry oil, oleoresin, aroma, culinary.

## INTRODUCTION

**Indian name of allspice: (Indian market price Rs.100/kg)**
Hindi: *Kabab chini*, Kannada: *Gandamenasu*, Malayalam: *Sarvasugandhi*, Tamil: *Sarvasukanthi*.

**Foreign name of spices**
Arabic: *Bahar*, *Bhar hub wa naim*, Danish: *Allehande*, Dutch: *Jamaica pepper*, *piment*, English: *Jamaica pepper*, *myrtle pepper*, *pimento*, *newspice*, Estonian: *Harilik pimwnsipuu*, *Vurts*, Finnish: *Maustepippuri*, French: *Piment. Piment Jamaique*, *Poivre aromatique*, *toute-epice*, *poivre de la Jamaique*, German: *Piment Neugewurz*, *Allgewurz*, *Nelkenpeffer*, *Jamaicapfeffer*, *Englisches Gewurz*, Hungarian: *Jamaikai szegfubors*, *Szegfubors*, *Pimento*, *Amomummag*, Icelandic: *Allrahanda*, Italian: *Pimento*, *pepe di Giamaica*, Norwegian: *Allehande*, Polish: *Ziele angielskie*, Portuguese: *Pimenta da Jamaica*, Russian: *Yamaiskiy pjerets*, Spanish: *Pimienta de Jamaica*, *Pimienta gorda*, Swedish: *Kryddpeppar*, Turkish: *Yeni bahar*.

**Figure-1: *Pimenta dioica* (Allspice plant).**

Allspice takes its name from its aroma, which smells like a combination of spices, especially **cinnamon**, **cloves**, **ginger** and **nutmeg**. Beverages such as spiced cider or mulled wine sometimes feature whole allspice berries. Allspice is also one of the key ingredients in Jamaican jerk chicken. Ground allspice is combined with sugar, salt, ginger, cloves, cinnamon and other herbs and spices, along with soy sauce, lime juice and oil to form a marinade. Allspice takes its name from its aroma, which smells like a combination of spices, especially cinnamon, cloves, ginger and nutmeg. In much of the world, allspice is called pimento because the Spanish mistook the fruit for black pepper, which the Spanish called pimienta. This is especially confusing since the Spanish had already called chillies pimientos. Let's also thank the Spanish for centuries of linguistic confusion created by naming all the natives they met 'Indians'.

**Other Names:** *English Spice, Jamaica Pepper, Clove Pepper, Myrtle Pepper, Pimenta, Pimento*

**Scientific Name:** *Pimenta dioica*, syn: *Pimenta officinalis, Eugenia pimento*, Family: Myrtaceae.

Allspice is the only spice that is grown exclusively in the Western Hemisphere. The evergreen tree that produces the allspice berries is indigenous to the rainforests of South and Central America where it grows wild. Unfortunately the wild trees were cut down to harvest the berries and few remain today. There are plantations in Mexico and parts of Central America but the finest allspice comes from Jamaica where the climate and soil are best suited to producing the aromatic berries. Allspice is the only spice that grows exclusively in the western hemisphere. It was originally discovered by **Christopher Columbus** (c. 1451 – 20 May 1506) during his second voyage. Prior to its discovery by Columbus, the Mayans and other indigenous cultures had been using allspice in religious rituals and meat preservation. There were various efforts to have allspice grow in Europe, but the temperate climate was not suitable for its cultivation. Because the berries have the appearance of pepper, they were initially named Jamaican pepper by the Spanish explorers because it resembles peppercorns.[1]

Allspice was used by the Mayans as an embalming agent and by other South American Indians to flavour chocolate. The name 'Jamaica' comes from Xamayca, meaning 'land of wood and water' in the language of the Arawaks. These natives used allspice to help cure and preserve meats, sometimes animals, sometimes their enemies. The allspice cured meat was known in Arawak as boucan and so later Europeans who cured meat this way came to be known as boucaniers, which ultimately became 'buccaneers'.

The spice was imported to Europe soon after the discovery of the new world. There were several attempts made to transplant it to spice producing regions of the east, but these trees produced little fruit. Despite its rich fragrance and a strong flavour resembling other more coveted spices, allspice never had the same caché in Europe as cinnamon or pepper. The English started making regular shipments to England in 1737, but by that time the lust for spices been eclipsed by other New-World products like sugar and coffee. It was quite popular in England though, where it came to be known as 'English Spice". In the Napoleonic war of 1812, Russian soldiers put allspice in their boots to keep their feet warm and the resultant improvement in odours is carried into today's cosmetic industries, where pimento oil is usually associated with men's toiletries (especially products with the word 'spice' on the label).


**Figure-2: Allspice as a combo pack of all-spice.**

**Spice Description**

Dried allspice berries resemble large brown peppercorns. Unripe berries are harvested and sun dried until the seeds in them rattle. They vary in size between 4-7 mm (1/8-1/4″) in diameter and are dark brown with wrinkled skins. The outer case contains two dark, hard kidney-shaped seeds. Allspice is available whole or ground. Sometimes the whole berry will be called 'pimento'.

**Bouquet:** pungent and aromatic, like a combination of nutmeg, clove, ginger and cinnamon.

**Flavour:** warm and sweetly pungent like the combination described above with peppery overtones.

**Hotness Scale:** 4

**Preparation and Storage**

Whole dried allspice will keep indefinitely when kept out of light in airtight jars. It can be ground in a spice mill or an electric coffee grinder. The ground spice loses flavour quickly.

**Culinary Uses of Allspice**

Jerked meats like pork, chicken and kid reflect the Spanish/Jamaican background of Allspice. It is a particularly popular spice in European cooking, an important ingredient in many marinades, pickling and mulling spices. Many patés, terrines, smoked and canned meats include allspice. A few allspice berries are added to Scandinavian pickled herring, to Sauerkraut, pickles, soups, game dishes and English spiced beef. Traditionally, allspice has been used in cakes, fruit pies, puddings ice cream and pumpkin pie. Some Indian curries and pilaus contain allspice and in the Middle East it is used in meat and rice dishes. It is also used in liqueurs, notably Benedictine and Chartreuse. Allspice can be used as a substitute, measure, for measure, for cinnamon, cloves or nutmeg. Conversely to make a substitution for allspice, combine one part nutmeg with two parts each of cinnamon and cloves.

**Attributed Medicinal Properties**

Because of its eugenol content, allspice has attributes similar to clove. It is a digestive and carminative. The oil is classed as rubefacient, meaning that it irritates the skin and expands the blood vessels, increasing the flow of blood to make the skin feel warmer. The tannins in allspice provide a mild anesthetic that, with its warming effect, make it a popular home remedy for arthritis and sore muscles, used either as a poultice or in hot baths. The benefits of allspice are only due to its diverse nutritional value. 100 grams of allspice contain about 263 calories, 9g fat, 77mg sodium, 1044mg potassium, 22g dietary fiber, and 6g protein.

**Traditional Medicinal Uses**

Allspice (*Pimenta dioica*) the 16th century Spanish explorers were intent on finding a New World source of black pepper and confused *Pimenta dioica* with the valuable East Indian spice (*Piper nigrum*). The name "allspice" is due to the unique scent of its leaves and berries, a blend of the aromas of cloves, black pepper, cinnamon and nutmeg. Used as a natural herbal remedy, the herb has carminative, digestive stimulant, and aromatic qualities. Its active constituents are anti-inflammatory, rubefacient (warming and soothing) and anti-flatulent. Allspice is rich in vitamins A, C, niacin, riboflavin, and thiamine, the minerals potassium, manganese, iron, selenium and magnesium, and contains the metabolites homo-mandelic acid and homovanillic acid.

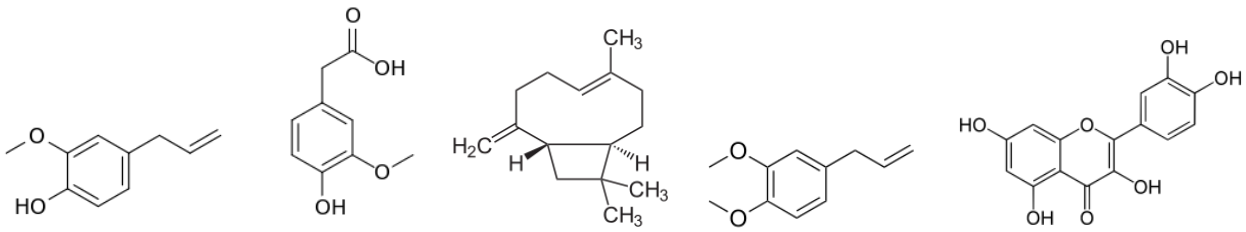
Its active elements are methyl eugenol and caryophyllene, resin, tannin, sugar, quercetin, glycosides, and sesquiterpenes; and it contains metabolites of homovanillic and homomandelic acids, malic and gallic acids, lignin, and bonastre. Another active constituent is the phenol eugenol, which is used by dentists as an antiseptic and a local anesthetic for teeth. Eugenol is a phenylpropanoid that gives allspice its characteristic pleasant, sweet aroma. *Pimenta dioica* is used as a traditional herbal remedy for treating flatulence and indigestion because its volatile oils contain eugenol, a weak antimicrobial agent. It suppresses the activity of prostaglandins in human colonic tissue and stimulates some digestive enzymes, including trypsin, an enzyme important for the digestion of protein. Recent studies show that allspice oil combined with extractions from garlic and oregano can work against *E. coli, Salmonella, and L. monocytogenes* infections. It's used traditionally as a natural remedy for stomach-ache, vomiting, diarrhea, fever, flu, colds, fatigue, diabetes, menstrual cramps, heavy menstrual bleeding and hysterical paroxysms. One of its active constituents, eugenol, is used for its local anesthetic and antiseptic properties and is included in many dental products. Dentists use eugenol as a local anesthetic and antiseptic for teeth and gums.[2]

**Figure-3: Kababchini as allspice berry.**

Crushed allspice berries are used as a topical application to treat bruises and to soothe sore joints and muscles. They contain tannins that have a mild anesthetic action. Tannis irritate the skin and expand the blood vessels, which increase the blood flow and make the skin feel warmer. Because of this warming effect, the berries are used as an herbal remedy for arthritis and sore muscles, either as a poultice or in hot baths. The warm, spicy aroma of Allspice Essential Oil is similar to that of clove and cinnamon essential oils. The high content of Eugenol is partly responsible for this similarity. Allspice Oil is a wonderful oil to use in the diffuser during the fall and winter. If used at full-strength, it can be a potent mucous membrane irritant, so it's best blended at a low ratio with other essential oils before diffusing. I particularly like Allspice Oil blended with Orange Oil or Bergamot Oil. Allspice Essential Oil's high Eugenol (a phenol) content suggests that Allspice may act as anti-viral oil. Allspice Essential Oil, in small dilutions, is said to act as an aphrodisiac. Its rich, warm aroma also complements

masculine blends. Although Allspice Essential Oil is regarded for its use within personal fragrancing, massage, arthritic and muscular applications, Allspice Oil can be a dermal irritant. If you choose to use Allspice Oil within topical applications, be certain to dilute it very well.

Allspice is widely used as a carminative, to prevent or relieve flatulence. It is used as both an aromatic stimulant and as a tonic for the gastrointestinal tract and digestive system, to treat vomiting, stomach ache, diarrhea and indigestion; along with digestive disorders such as dyspepsia and colic, and is known to improve the appetite. The essential oil in Allspice is a tonic for the nervous system, and has been used to treat nervous exhaustion, hysterical paroxysms, neuralgia, and convulsions. When used externally, Allspice warming effects are used to relieve chest infections, arthritis and rheumatism, bruises, and muscle aches and pains. Allspice has been used as a natural herbal remedy for fever, colds, flu, diabetes, menstrual cramps, and heavy menstrual bleeding. Allspice extracts have antioxidant, antiseptic and anesthetic properties, and usefulness in fighting yeast and fungal infections. Allspice is a natural source of β-carotene, vitamins A, $B_1$, $B_2$, and C, niacin, thiamine, and riboflavin; along with the minerals iron, potassium, magnesium, selenium, and manganese.




Eugenol Homovanillic acid Caryophyllene Methyl eugenol Quercetin

**Figure-4: Chemical constituents.**

Formerly, the berries were used as an appetite stimulant, for stomachache, and for painful menstruation; leaves used for pain, fever, cold remedy, toothache, anodyne, astringent, and carminative. In Jamaica, the fruit is used to treat influenza and stomachache; used in Guatemala to treat rheumatism. In the Dominican Republic, the fruits, decocted with salt, are also used as an antiemetic (weniger and robineau). Other uses in Middle Eastern, South American, and Asian countries include the treatment of obesity, hyperglycemia, menstrual cramps, abdominal pain, digestive ailments, inflammatory conditions, and high blood pressure.[3]

**Plant Description and Cultivation**

A tropical evergreen tree, growing 7-13 m (22-43 ft) in height. It has smooth grey bark, with elliptic, glossy leaves, dark green and glossy, up to 15 cm (6 in) long. It has small white flowers appearing in midsummer followed by green berries that turn purple when ripe. Trees are planted about 10 m (30 ft) apart, allowing room for a full canopy of fruit-bearing branches. Fruit starts to develop after about five years, and becomes full-bearing after twenty years. These plantations are not called orchards, but 'walks" and in the summer, when whole trees are blanketed in aromatic flowers, the 'pimento walk' was a stroll through the grounds. The botanist Patrick Browne wrote in 1755: "nothing can be more delicious than the odour of these walks, when the trees are in bloom, as well as other times; the friction of the leaves and small branches even in a gentle breeze diffusing a most exhilarating scent. Berries are picked when they have reached full size, but before they can ripen. The height of the trees makes mechanizing the process difficult, so hand picking or pulling off branches is still common. Berries are then 'sweat' for a few days, then they are spread out on a concrete platform called a 'barbeque' where they are dried. Leaves from the male trees are also harvested for eugenol oil.

**Pharmacognostical & Phytochemical studies:** Extracts from leaves of all spice (*Pimento dioica*) are investigated for phytochemical constituent and anti oxidant activity. Leaf extract with ethyl alcohol revealed the presence of tannins, anthraquinones, flavonoids, alkaloids, terpenoides, saponins, cardiac-glycosides, reducing sugars and phlobatanins. In view of the presence of antioxidant properties of the plant, it is aimed to understand whether the plant can be use of in fighting the malignancy, other cancer causing agents and for other disease management usages. *Pimenta dioica* (Linn.) Merill. Family: Myrtaceae, well known for its berries called Pimento, has been used as an important spice since time immemorial, for its culinary as well as medicinal qualities. It is also known as Allspice due to its intricate aroma which is a medley of aroma from spices such as Clove, Nutmeg and Cinnamon. In India, the leaves of *Pimenta* are used to flavor rice which gives it a typical aroma. Traditional culinary practice uses the dried berries for marinating meat. Various compounds have been isolated from the plant which belongs to categories like phenylpropanoids, tannins, glycosides and essential oil. The present article is a humble effort to study the work done till date on this important spice. *Pimenta dioica* commonly known as allspice or pimento. Here we have made an attempt to explore pharmacognostical characters and preliminary phytochemical characters of pimento leaves. Ovate shaped leaves present in Pimento tree are petiolate with

entire margin and mucronate apex. The spicy green leaves have symmetric base with opposite phyllotaxy. Powder microscopy of air dried pulverized powder of *Pimenta dioica* showed epidermal trichomes, calcium oxalate prisms, cells containing volatile oil, starch grains and lignified phloem fibers. Powder microscopy also reveals the presence of paracytic stomata in epidermal cells. Various leaf constants like stomatal number, stomatal index, palisade ratio, vein-islet number and vein termination number have been found out. Moisture content of the pimento leaf also determined. Different ash values like total ash value, acid insoluble ash value and water soluble ash values also found out. Alcohol soluble extractive value and water soluble extractive values were 19.2 % and 3.6 % respectively. The presence of alkaloids, saponins, tannins, flavanoids, proteins and triterpenoids are indicated by phytochemical screening of aqueous alcoholic extract of Pimento leaves. These results will help the fellow scientists and others who will research in Pimenta dioica to identify the plant and species.[4]


**Figure-5: Allspice harvesting and packaging.**

*Pimenta dioica* (Linn.) Merill. (Myrtaceae) is well-renowned, industrially important, aromatic spice plant widely used in traditional systems of medicine, food, perfumery and cosmetic industries. Present study describes the essential oil content, composition, and antioxidant capacity of mature and immature leaves of *Pimenta dioica*. Essential oil was extracted using Clevenger-type apparatus for 5 hrs. Leaf essential oil composition was analyzed using GC-MS. Quantification of Total Antioxidant Capacity (TAC), Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) was carried out using standard methodologies. The oil yield was 0.80% (v/w) of fresh weight. Twelve compounds comprising more than 97% of total composition were identified by GC/MS analysis. Eugenol (85.33±2.0 %) was identified as a major constituent of essential oil and followed by β-caryophylene (4.36±0.3%), cineole (4.19±0.3%), linalool (0.83±0.11%) and α-humulene (0.76±0. 12%).Immature leaf extracts exhibited the marked Total Antioxidant Capacity (TAC) (537.18±11.62mg) trolox equivalent per g of sample); Total Phenolic Content (TPC) (99.09±3.65 mg Gallic acid equivalent per g of sample), and Total Flavonoid Content (TFC) (136.71±3.24 mg Rutin equivalent per g of sample). Presence of greater amount of eugenol in essential oil, TAC, TPC and TFC in leaf extracts undoubtedly demonstrated potential of *Pimenta dioica* essential oil and leaf material as a fabulous raw material for food, perfumery and cosmetic industries. Further harvesting of immature leaves could be suggested for better therapeutic benefits.

*Pimenta dioica* (L.) Merr (family: Myrtaceae) commonly known as Allspice, is a distinguished plant recognized for its berries. For the current study, the essential oil yield and chemical composition of Jamaican Allspice berry was investigated. The oils were obtained by hydro distillation (HD), solvent extraction using hexane and super critical fluid extraction (SFE) with 1% ethanol as co-solvent. Oil yield percentages amounted to 1.4, 6.4 and 6.8%w/w for the HD, SFE and SE oils respectively. Analysis of the oils by GC and GC-MS resulted in the identification of forty three (43) compounds representing 90.26% HD oil; 75.40% hexane oil and 82.99% SFE oil respectively. Main components identified were eugenol (61.36%), β-caryophyllene (4.58%), α-humulene (1.90%) and 1,8-cineole (1.89%); minor components included δ-cadinene (1.08%), Germacrene D (0.86%) and β-elemene (0.69%).All compounds identified were common among each extracted oil type. Fundamentally, for commercialization purposes, a SFE extracted oil is preferred as it is a modernized technique which shortens extraction time, reduces organic solvent consumption, prevents pollution and eliminates organic solvent residues whist producing high essential oil yields.

Antioxidants are free radical scavengers found in spices which may play a significant role in preventing cell death. Allspice is a dried unripe berry obtained from the *Pimento dioica* plant that may have antioxidant potential. The objective of this study was to determine the total phenolic, flavonoid content and antioxidant capacity of allspice using selected assays such as 2,2-diphenyl1-picrylhydrazyl (DPPH), Ferric Reducing Antioxidant Potential (FRAP) and Trolox Equivalent Antioxidant Capacity (TEAC), Nitric Oxide (NO) and Oxygen Reducing Antioxidant Capacity (ORAC). Total phenolic and flavonoid contents of allspice were determined using

both water and methanol extraction. A comparison of antioxidant activity of water and methanol extracts of allspice was conducted using the different assays (DPPH, TEAC, NO, ORAC and FRAP). The total phenolic content (6.9%), NO scavenging (38.8%) and ORAC (35.1%) activity were higher in methanol compared to water extracts of allspice while flavonoids (57%), FRAP (11.2%), and TEAC (1.82%) were higher in water extracts compared to methanol extracts of allspice. The total phenolic and flavonoid content were higher in methanol extracts compared to water extracts of allspice. The $IC_{50}$ (DPPH), FRAP and TEAC, NO scavenging and ORAC activity were higher in methanol extracts compared to water extracts of allspice. Total flavonoid content, FRAP and TEAC, NO scavenging and ORAC were significantly higher ($p \leq 0.5$) in methanol extracts compared to water extracts of allspice. This shows that allspice has antioxidant potential and that the method of extraction can play a crucial role on the number of phytochemicals extracted from the plant. Utilization of allspice in food products may provide additional functional properties.[5]

**Figure-6: Tasty recipe becomes much yummy to get ready for tummy.**

All spice samples were examined for phytochemical constihlents and antimicrobial properties. Qualitative phytochemical analysis of allspice extracts revealed the occurrence of alkaloids, coumarins, flavonoids, saponins, terpenes and tannins. Turmeric, clove and bay leaf showed the highest frequency of occurrence of these plant components among others. Terpenes were present in 94.12% of the samples evaluated. Ethanol extracts of spice samples were in vitro evaluated for their antimicrobial properties using well diffusion assay against six Gram positive and Gram negative bacteria. Results showed that All spice extracts possess biological activity on one or more of the test bacteria. Clove extracts displayed the highest antibacterial activity (19.5 mm) against Escherichia coli, followed by bay leaf (19 mm) against the same bacteria and cumin (19 mm) against Pseudomonas aeroginosa, at 1000 ~g/100 Ill. Extracts of galangale, turmeric and fennel also exhibited a broad spectrum biological activity. The most susceptible bacteria, based on frequency values, were *E. coli* (76.4%), *P. aeruginosa* and *Bacillus subtilis* (58.82%) and the least susceptible species were *Salmonella arizonae* (23.52%) and *Enterobacter aerogenes* (17.64%) at 1000 Ilg/100 Jll. Overall, the presence of biologically active compounds and potent antimicrobial properties elucidate the potential use of spices in small amounts, individually or in combination in human therapy or folk medicine and as food preservative.[6]

**Pharmacological activities:** Now-a-days majority of world population rely on the plant preparations as medicines to cure diseases, as they are considered safe and as effective as allopathic preparations without any side effects. All Spices are plant products having aroma. They are mainly used during cooking to impart flavor and taste to the dish.They also possess medicinal values. The present study was designed to evaluate the antimicrobial activity of Indian All spices against Gram positive and Gram negative pathogenic bacteria viz., *S. aureus, B. subtilis, B. cereus, E.coli, S. typhi, P. aeruginosa* using aqueous, ethanolic and methanolic extracts. Among all extracts tested alcoholic extract of Star anise (*Ilicium verum*), and black pepper (*Piper nigrum*) showed maximum antimicrobial activity against gram negative bacteria while alcoholic extract of clove (*Syzygium aromaticum*) and blackpepper showed maximum activity against gram positive bacteria. By and large, allspice used during the studies proved as antibacterial compounds with maximum activity index (AI) 1.42 exhibited by alcoholic extract of black pepper against *E. coli*.[7]

Plant-derived dietary compounds have shown potential as chemo preventive and anticancer agents to prolong survival and reduce breast cancer deaths. Lack of specific mechanism of action is the leading concern for adopting these edible compounds as chemo preventive or adjuvant therapeutics against breast and other cancers. The unripe berries of *Pimenta dioica*, also called Allspice, are widely used in cuisines worldwide; contain a cornucopia of bioactive compounds with potential therapeutic properties. Limited studies on the potential anticancer compounds present in Allspice prompted us to hypothesize and test potential antiproliferative agents in an aqueous extract of Allspice(AAE). The potential anti-tumor activity of an Aqueous Allspice Extract (AAE) wastested on Breast Cancer cells. AAE reduced the viability and clonogenic growth of BrCacells ($IC_{50}$≈100µg/ml) but had limited toxicity in non-tumorigenic, quiescent cells ($IC_{50}$>200µg/ml). AAE induced antiproliferative activity was inconsistent with

cell cyclearrest, apoptosis or necrosis, but was strongly associated with characteristics ofautophagy. The characteristics included high vacuolation, increase in levels of autophagy marker protein LC3 and showed LC3 positive puncta. Silencing the autophagy related gene (ATG) expression in both estrogen receptor+ (ER+) and ER- cells by siRNAprevented AAE-induced cell death. In an ERα+ cell line MCF-7, ATG7 silencing abrogated AA Ecytotoxicity by 80% and in the ERα- MDA-MB231 cells, 50% cell death was rescued. Inhibiting ATG5 gene yielded similar yet less pronouced results. Further, AAE down-regulated the Akt/mTOR signaling, which potentially led to autophagyinduction. AAE showed enhanced cytotoxicity in BrCa cells when combined with anmTOR inhibitor, rapamycin. AAE also exhibited anti-metastatic activities against MDAMB231cells where it decreased invasive potential and caused decrease in mRNA levels of EMT markers N-cadherin, Vimentin, Slug. AAE was also found to significantly decrease Estrogen Receptor α (ERα) protein level in MCF7 and T47D cells, through both proteasome-mediated degradation and transcriptional down-regulation mechanisms. Oraladministration of AAE showed anti-tumor activity in vivo on MB231 xenografts inathymic mice. Tumor growth rate was reduced by 17% in gavaged mice. Further, tumor growth latency delay in palpable tumor growth was significantly increased in mice pretreatedwith AAE for two weeks (38%) and in those animals injected with MB231 cells pre-incubated with low concentration of AAE for 2 days. These results demonstrate antitumor and chemo preventive potential of AAE against breast cancer.[8]

**Clinical trials:** The antimicrobial property of volatile aromatic oils from medicinal as well as other edible plants has been recognized since antiquity. Candida species are an important cause of opportunistic infections in the oral cavity of immune compromised patients and vaginal candidiasis. The antifungal activity of the essential oil of *Pimento dioica* (allspice oil) was investigated against 75 clinical isolates of *Candida albicans* and non-albicans Candida. Sensitivity profile of clinical isolates to undiluted and diluted (3:1, 2:2 and 1:3) allspice oil was evaluated by disc diffusion method. Minimum inhibitory concentrations (MIC) and minimum fungicidal concentrations (MFC) were evaluated by broth microdilution and broth macrodilution method. Allspice oil effectively inhibited all clinical isolates of *C. albicans* and non-albicans Candida with growth inhibition zones ranging from 24-44mm. Allspice oil inhibited C. albicans growth with mean minimum inhibitory concentration (MIC) of 0.985l/ml (v/v) and 1.14 5l/ml (v/v) by broth micro dilution and broth macro dilution method, respectively. The clinical isolates of *C. albicans* required as high as 1.25 5l/ml (v/v) concentration of allspice oil for its inhibition by both methods. The isolates of non-albicans Candida showed MIC range of 0.15 – 2.50 5l/ml (v/v) by broth micro dilution and 0.31 – 2.50 5l/ml (v/v) broth macro dilution. The isolates of *C. krusei* exhibited higher sensitivity to allspice oil than other isolates with lowest MIC of 0.15 5l/ml (v/v).[9]

List of natural appetizers: (1) Ajowan (*Trachyspermum ammi* L.); Family: Apiaceae; Parts used: Fruit (2) **Allspice (*Pimenta dioica* (L) Merr.); Family: Myrtaceae; Parts used: Fruit and leaf** (3) Aniseed (*Pimpinella anisum* L.); Family: Apiaceae; Parts used: Fruit (4) Asafoetida (*Ferula foetida* L); Family: Apiaceae; Parts used: Oleogum resin from rhizome and thickened root (5) Basil (*Ocimum basilicum* L.); Family: Lamiaceae; Parts used: Leaf (6) Bay Leaf (*Laurus nobilis* L.); Family: Lauraceae; Parts used: Leaf (7) Bird's Eye Chilli (*Capsicum frutescens* L.); Family: Solanaceae; Parts used: Fruit (8) Camboge (*Garcinia cambogia* (Gaertn).Desr); Family: Clusiaceae; Parts used: Rind (9) Caper (*Capparis spinosa* L.); Family: Capparidaceae; Parts used: Flower buds (10) Capsicum (*Capsicum annuum* L.); Family: Solanaceae; Parts used: Fruit (11) Caraway (*Carum carvi* L.); Family: Apiaceae; Parts used: Fruit (12) Cassia (*Cinnamomum cassia* Blume); Family: Lauraceae; Parts used: Bark (13) Celery (*Apium graveolens* L.); Family: Apiaceae; Parts used: Leaf, fruit & stem (14) Chilli; Family: Solanaceae; Parts used: Fruit (15) Cinnamon (*Cinnamomum zeylanicum* Breyn); Family: Lauraceae; Parts used: Bark (16) Clove (*Syzygium aromaticum* (L); Family: Myrtaceae; Parts used: Unopened Flower bud (17) Coriander (*Coriandrum sativum* L.); Family: Apiaceae; Parts used: Leaf & Fruit (18) Cumin (*Cuminum cyminum* L.); Family: Apiaceae; Parts used: Fruit (19) Curry leaf (*Murraya koenigii*(L) Sprengel); Family: Rutaceae; Parts used: Leaf (20) Dill (*Anethum graveolens* L.); Family: Apiaceae; Parts used: Fruit (21) Fennel (*Foeniculum vulgare* Mill.); Family: Apiaceae; Parts used: Fruit (22) Fenugreek (*Trigonella foenum-graecum* L.); Family: Fabaceae; Parts used: Seed (23) Garlic (*Allium sativum* L.); Family: Alliaceae; Parts used: Bulb (24) Ginger (*Zingiber officinale* Rosc.); Family: Zingiberaceae; Parts used: Rhizome (25) Greater Galanga (*Alpinia galanga* Willd.); Family: Zingiberaceae; Parts used: Rhizome (26) Horse Radish (*Armoracia rusticana* Gaertn.); Family: Brassicaceae; Parts used: Root (27) Hyssop (*Hyssopus officinalis* L.); Family: Lamiaceae; Parts used: Leaf (28) Juniper berry (*Juniperus communis* L.); Family: Lamiaceae; Parts used: Leaf (29) Kokam (*Garcinia indica* Choisy); Family: Clusiaceae; Parts used: Rind (30) Large cardamom (*Amomum subulatum* Roxb.); Family: Zingiberaceae; Parts used: Fruit, Seed (31) Lovage (*Levisticum officinale* Koth.); Family: Apiaceae; Parts used: Leaf & stem (32) Marjoram (*Marjorana hortensis* Moench.); Family: Lamiaceae; Parts used: Leaf (33) Mace (*Myristica fragrans* Houtt.); Family: Myristicaceae; Parts used: Aril (34) Mint (*Mentha piperita* L.); Family: Lamiaceae; Parts used: Leaf (35) Mustard (*Brassica juncea* L.Czern); Family: Brassicaceae; Parts used: Seed (36) Nutmeg (*Myristica fragrans* Houtt.); Family: Myristicaceae; Parts used: Seed (37) Oregano (*Origanum vulgare* L.); Family: Lamiaceae; Parts used: Leaf (38) Paprika (*Capsicum*

*annuum* L.); Family: Solanaceae; Parts used: Fruit (39) Parsley (*Petroselinum crispum* Mill.); Family: Apiaceae; Parts used: Leaf (40) Pepper (*Piper nigrum* L.); Family: Piperaceae; Parts used: Fruit (41) Pepper Long (*Piper longum* L.); Family: Piperaceae; Parts used: Fruit (42) Pomegranate (*Punica granatum* L.); Family: Punicaceae; Parts used: Seed (43) Poppy seed (*Papaver somniferum* L.); Family: Papaveraceae; Parts used: Seed (44) Rosemary (*Rosmarinus officinalis* L.); Family: Lamiaceae; Parts used: Leaf (45) Saffron (*Crocus sativus* L.); Family: Iridaceae; Parts used: Stigma (46) Sage (*Salvia officinalis* L.); Family: Lamiaceae; Parts used: Leaf (47) Savory (*Satureja hortensis* L.); Family: Lamiaceae; Parts used: Leaf (48) Small cardamom (*Elettaria cardamomum* Maton); Family: Zingiberaceae; Parts used: Fruit, Seed (49) Star Anise (*Illicium verum* Hook.); Family: Illiciaceae; Parts used: Fruit (50) Sweet flag (*Acorus calamus* L.); Family: Araceae; Parts used: Rhizome (51) Tamarind (*Tamarindus indica* L.); Family: Caesalpiniaceae; Parts used: Fruit (52) Tarragon (*Artemisia dracunculus* L.); Family: Asteraceae; Parts used: Leaf (53) Tejpat (*Cinnamomum tamala* (Buch Ham); Family: Lauraceae; Parts used: Bark & Leaf (54) Thyme (*Thymus vulgaris* L.); Family: Lamiaceae; Parts used: Leaf (55) Turmeric (*Curcuma longa* L.); Family: Zingiberaceae; Parts used: Rhizome (56) Vanilla (*Vanilla planifolia* Andr.); Family: Orchidaceae; Parts used: Pod.

## CONCLUSION

The most important health benefits of allspice include its ability to act as a pain reliever, increase circulation, protect the gastrointestinal system, improve mood, boost the immune system, eliminate fungal infections, lower blood pressure, and reduce inflammation. This powerful spice is actually derived from the dried fruit of the pimento tree, which is why it is commonly called Jamaica pepper, pimenta, or pimento, among other geography-specific nicknames. Native to Central America, parts of the Caribbean, and Mexico, the allspice bearing tree has the scientific name of *Pimenta dioica* and has gradually spread throughout the world due to its unique flavor and its healthy quality. The name allspice is because of the dried brown berries (which look like large peppercorns), smell and taste like a mixture of cinnamon, cloves, and nutmeg. The berries are picked when they're ripe and allowed to dry in the sun, ending up as the slightly shriveled, hard berries known as allspice. These can then be ground up into spice for culinary use, or the essential oil can be extracted. Allspice is a key ingredient in Caribbean cuisine, particularly in Jamaica, but it has also been adopted by many other cultures around the world, including the Middle East and parts of North America. This spice can be used in sweet or savory dishes and is commonly found in desserts, chilis, soups, meat dishes, sauces, curries, and even certain types of liqueurs. The flavor is certainly unique, but what makes this spice even more intriguing is the high concentration of beneficial nutrients and organic compounds, such as eugenol, quercetin, and tannins that result in some impressive health benefits of allspice.

**Health benefits of allspice include**

1. Anti-inflammatory Qualities: One of the most celebrated aspects of allspice is its ability to lower inflammation and alleviate pain in parts of the body. The active ingredients in the spice have chemical compounds that eliminate inflammation, making it an ideal spice to give you some relief from arthritis, gout, muscle aches, or even hemorrhoids. It also has certain analgesic components that allow for pain reduction in the case of injury or surgical recovery.
2. Aids in Digestion: The calming, rubefacient effects of allspice's organic components make it perfect for soothing the stomach and also facilitating healthy digestion. The eugenol found in allspice can eliminate digestive issues such as diarrhea, nausea, vomiting, and constipation, while also stimulating regularity, which reduces bloating and excess flatulence. The anti-inflammatory aspect of allspice further eases cramps, which can ease the entire process of digestion.
3. Boosts Immunity: Research has shown certain antibacterial and antifungal effects of allspice, particularly in terms of stomach bacteria (E. coli and Listeria monocytogenes). In addition to helping the gastrointestinal system function smoothly, it also protects it from outside attack through a natural immune response. Furthermore, when allspice is added to certain foods, it can neutralize the bacteria at that level, before it ever enters your body to begin doing damage.
4. Antioxidant Capacity: The presence of eugenol, quercetin, tannins, and other chemical compounds makes allspice a very potent antioxidant, as many of those substances are perfect for neutralizing free radicals and eliminating them from the body. Free radicals are the harmful byproducts of cellular metabolism that can cause healthy cells to mutate, often leading to serious diseases – even cancer. The high level of vitamin C and vitamin A present in allspice also contribute to this antioxidant activity.
5. Dental Care: The antimicrobial, antibacterial, and antiseptic aspects of allspice can help to boost your dental health; although gargling with this spice wouldn't be particularly pleasant, it has been connected to healthier dental and gum health by protecting against bacterial pathogens.
6. Improves Circulation: With significant levels of copper and iron, allspice is ideal for boosting circulation, as these are essential components of red blood cells. Furthermore, the rubefacient aspect of the spice is a stimulant and warms the body. Combined with increased blood flow, this can result in additional energy and the proper oxygenation of extremities in the body. Iron also functions in the creation of certain enzymes that are crucial for overall metabolism.

7. Protects Heart Health: The potassium found in allspice has a positive effect on heart health, as it is a vasodilator and releases much of the tension on the cardiovascular system. This causes an increase in blood flow through the relaxed blood vessels and reduces the strain on the arteries and heart, thereby lowering the chances of developing atherosclerosis, and subsequently, strokes and heart attacks.

*Word of Caution: Although it is clearly a healthy, beneficial spice, it can cause serious allergic reactions in hypersensitive individuals. Also, if you have existing gastric ulcers or ulcerative colitis, it is best to avoid using this spice, as it can exacerbate the conditions. As always, before making any major change to your diet or trying out new things, consult a medical professional to make sure the effects won't be negative.*

**REFERENCES**

1. Dhrubo Jyoti Sen (2016). Oregano: the mountain of joy on taste buds: World Journal of Pharmaceutical Sciences, 2016; 4(12): 226-234.
2. Lorence, David H.; Flynn, Timothy W.; Wagner, Warren L. (1995). Contributions to the Flora of Hawai'i III" (PDF). Bishop Museum Occasional Papers. Honolulu, Hawaii: Bishop Museum Press, 1995; 41: 19–58.
3. Nirmala Babu Rao and O. Sita kumara (2015). Phyto chemical analysis of all spice pimenta dioica leaf extract. World Journal of Pharmacy and Pharmaceutical Sciences, 2015; 4(01): 1400-1404.
4. Mathew George and Lincy Joseph (2013). Pharmacognostical and Phytochemical Characterization of Pimento Leaves. Global Journal of Pharmacology, 2013; 7(1): 75-80.
5. Dharmadasa R.M, Abeysinghe D.C, Dissanayake DMN, Abeywardhane K.W. and Fernando N.S. (2015). Universal Journal of Agricultural Research, 2015; 3(2): 49-52.
6. Ebube N. Onwasigwe, Martha Verghese, Rajitha Sunkara, Louis Shackelford and Lloyd T. Walker (2017). Leaf Essential Oil Composition, Antioxidant Activity, Total Phenolic Content and Total Flavonoid Content of Pimenta Dioica (L.) Merr (Myrtaceae): A Superior Quality Spice Grown in Sri Lanka. Food and Nutrition Sciences, 2017; 8: 778-792.
7. Q. Mandeet, A. Hassan and Z. Isa (2003). Antibacterial activity of certain spice extracts. Journal of Spices and Aromatic Crops, 2003; 12(2): 146-153.
8. H.G. Shete and M.P. Chitanand (2014). Antimicrobial Activity of Indian All Spice. International Journal of Current Microbiology and Applied Sciences, 2014; 3(8). ISSN: 2319-7706.
9. Lei Zhang. (2015). Novel Mechanism of Breast Cancer Prevention and Treatment Using Natural Extract of Pimenta Dioica. University of Miami Scholarly Repository 2015-07-24.