



DEVELOPMENT OF A TASTEMAKER CUM IMMUNITY BOOSTER FROM TRADITIONAL NUTRITIONAL SPICES

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Abstract

Background: India is the largest producer and consumer of some important common spices. Major Indian spices include pepper, cardamom, ginger, turmeric and chilies. Commercial cultivation in India is undertaken on 27 spices besides the herbal spices.

Spices and herbs are mostly used as seasonings to impart flavors, pungency, aroma and color in the food. In addition, spices enhance shelf life of the food by preventing and delaying the spoilage and by preserving the sensory attributes of food products. Spices contain several important phytochemicals like aromatic compounds, essential oils, phenolics and pigments which impart characteristic flavor and aroma and give a herbal appeal to the food and beverages and enhance their consumer acceptability. In addition, the active components of these herbs and spices are endowed with tremendous functional properties and medicinal values providing several health benefits and immunity. The era of Covid-19 has seen a spiked consumption of spices and herbs based health drinks and concoctions for providing these health benefits and immunity. The present chapter deals with the characteristics of some important Indian spices, their usages, active components present in them along with exploring their health benefits, functional and immunomodulatory properties.

Keywords: Indian spices, herbal spices products, functional foods, seasonings, phytochemicals, bioactive components

1. INTRODUCTION

India has been famous for varieties of spices since the ancient time for its exotic flavor, taste and medicinal values, therefore known as the home of Spices [1]. Spices means whole or ground form obtained from natural plants or vegetable products which has been used for imparting flavor, aroma and pungency to foods and also used for seasoning of foods. It also has non-food applications in dyeing, perfumery products and nutraceutical industries. It mask the spoiled flavor of meat that enhance the shelf life of foods [2]. Different parts of the plants or tree are used as spices such as fruits, stigma, bark, seeds, leaves, kernel, aril, bulbs, berries etc.

Around the world about more than 70 types of spices are grown, whereas pepper, cardamom, ginger, turmeric and chillies are the most common spices widely grown in India. However India is the largest producer as well as consumer of spices. Commercial cultivation in India is undertaken on 27 spices besides the herbalspices. The most famous spices of India is black pepper, which is known as the king of spices. Kerala got first position in the production of black pepper with contributing about 97% of the total production however cardamom known as the queen of spices which has been also used as essential commodity in the world. The leading spice producing states in India are the Andhra Pradesh, Karnataka, Kerala, Gujarat, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal.

Spices are mostly used as flavoring agent in a number of foodstuffs like curries, bakery products, pickles, processed meat, beverages, liqueurs etc. They enhance or change the flavors of the foods. These herbs and spices endowed with tremendous functional properties and medicinal values provide great health benefits and immunity [3, 4].

2. CLASSIFICATION OF SPICES

➤ Indian spices can be categorized based on its plant parts used, origin and flavor and economic importance. The classification is further given as here under.

2.1 Based on its plant parts

It is categorized based on its leaf, root, bulb, fruit, rhizome, bark, seed, pod, Kernel, bud, floral parts, latex, berry and aril. Classification is given as follows:

- Seed: Cumin, black cumin, fenugreek, coriander, fennel, ajwain, poppy, aniseed and mustard.
- Bulb: Onion, garlic and leek.
- Bark: Cinnamon and cassia.
- Fruit: Chili, cardamom, allspice and kokum.
- Leaf: Mint, curry-leaf, bay-leaf, chive, rosemary and savory.
- Pod: Vanilla and tamarind.
- Kernel: Nutmeg.
- Bud: Clove and caper.
- Latex: Asafoetida.
- Berry: Black pepper, juniper and allspice.
- Rhizome: Turmeric, ginger, and galangal.

2.2, Based on origin and flavor

➤ Based on the origin and flavor spices can be classified as aromatic spices, pungent spices, phenolic spices and colored spices. Classification is given as follows:

- Pungent spices: Ginger, chili, black pepper and mustard
- Phenolic spices: Clove and allspice
- Aromatic spices: Cardamom, aniseed, celery, cumin, coriander, fenugreek and cinnamon.
- Colored spices: Turmeric, saffron and paprika


3. COMMON INDIAN SPICES





➤ Common Indian spices, parts used and active compounds present in them are listed in **Table 1** and their usage and health benefits are presented in **Table 2** and discussed in this section.





Spices Name	Scientific Name	Plant part use asspice	Active compounds
Ginger	Zingiber officinale Rosc.	Rhizome	Gingerol and shogaol
Turmeric	Curcuma longa L.	Rhizome	Curcumin
Coriander	Coriandrum sativum L.	Leaf & Fruit	Geraniol
Cumin	Cuminum cyminum L.	Fruit	Aldehyde cumino
Cardamom (small)	Elettaria cardamomum Maton	Fruit,Seed	Cineole, pinene, sabinene andporneol
Cardamom (Large)	Amomum subulatum Roxb.	Fruit,Seed	Cineole, pinene, sabinene andporneol
Chili	Capsicum annum L.	Fruit	Capsaicin
Fenugreek	Trigonella foenum- graecum L.	Seed	Rhaponticin and isovitexin
Aniseed	Pimpinella anisum L.	Fruit	Anethole
Ajwain	Trachyspermum ammi L.	Fruit	Thymol
Caraway	Carum carvi L.	Fruit	D-carvone and D- limonere
Cinnamon	Cinnamomum zeylanicumBreyn	Bark	Eugenol, cineole and cinnamaldehyde
Garlic	Allium sativum L.	Bulb	Allicin
Kokam	Garcinia indica Choisy	Rind	Anthocyanin
Saffron	Crocus sativus L.	Stigma	Crocin and crocerin
Pepper	Piper longum L.	Fruit Long	Peperine
Clove	Syzygium aromaticum(L)	Unopened Flower bud	Eugeniol
Asafoetida	Ferula asafoetida L	Root & Rhizome	Ferulic ester
Bay Leaf	Laurus nobilis L.	Leaf	Eugenol, methyl eugenol andelemicin
Nutmeg & Mace	Myristica fragrans Houtt.	Seed	Myristicin
Poppy seed	Papaver somniferum L.	Seed	Thiamin, folate,
Capsicum	Capsicum annum L.	Fruit	Capsaicin
Celery	Apium graveolens L.	Fruit & Stem	Umbelliferone and Alpha-linoleicacid
Dill	Anethum graveolens L.	Fruit	Limonene
Cassia	Cinnamomum cassia.Blume	Bark	Cinnamaldehyde
Star Anise	Illicium verum Hook.	Fruit	Shikimic acid

Table 1.

List of common spices used in India, parts used and active compounds present in them.

Spices	Uses	Benefits	Picture of spices
Turmeric	Used as blood purifier & antibiotics. It is also used in cooking and skin care products.	Turmeric has been shown to boost the immune system. Studies have shown that turmeric modulates the activation of her T-cells, B-cells, macrophages,	

		neutrophils, natural killer cells, dendritic cells and boosts the body's antibody response.	
Cardamom	It is commonly used in sweets and pharmaceutical sector as a flavor and smell enhancer.	It is widely used in stomach disorder and problems of respiratory System. Chewing of whole cardamom is also good for coping with diabetes.	
Cinnamon	It is mainly used in preparing masalas and flavoring dishes.	Cinnamon lowers blood cholesterol levels by naturally producing insulin. Cinnamon has powerful antibacterial and antifungal properties that naturally help the immune system fight the inevitable bacteria it encounters. Help.	
Coriander	Its leaves and seeds are used in cooking. The oil of coriander is used as antimicrobial property and as a natural fragrance in perfumery industry.	Coriander is used for allergies, indigestion, joint pain and rheumatism.	
Clove	Clove is a highly valuable drug for its digestive, stimulating, anti-flatulence, and anti-helminth properties.	It is mostly used in many households as an aid to prevent the minor disorders like indigestion, flatulence, tooth ache etc.	

Fenugreek	Fenugreek is mainly used as a leafy green vegetable and the seeds are used for flavoring and preparing masalas. It also has medicinal uses.	Fenugreek seed tea or sweet fudge is good for increasing breast milk. It also helps treat diabetes and lower cholesterol levels.	
Black Pepper	It is mainly used in cooking, particularly for garnishing.	A strong immune system is key to disease prevention, and black pepper can help here as well. Its active ingredients serve to strengthen the white blood cells that the body uses to fight off invading bacteria and viruses.	
Cumin	Cumin is used in cooking and has medicinal properties. Researchers believe cumin may help kill harmful bacteria that are trying to attack the immune system.	Cumin is an excellent source of iron and keeps your immune system healthy. Water boiled with cumin is good for dysentery.	
Caraway	Caraway seeds are quite helpful when it comes to fighting off bacterial illnesses.	This beneficial factor of caraway seeds is contributed by the herbal oils found in them, which are also known to be natural inhibitors of the growth and replication of bacteria strain, thus aiding your immune system in fighting	




Asafoetida	Asafoetida is used to flavor foods, especially snacks, and has medicinal properties. Asafoetida is an effective remedy for various stomach ailments.	Asafoetida is traditionally used for the treatment of different diseases, such as whooping cough, asthma, ulcer, epilepsy, stomachache, flatulence, bronchitis, intestinal parasites, antispasmodic, weak digestion and influenza.	
Bay leaf	Bay leaves are an excellent source of vitamin A, vitamin B6, and vitamin C.	It adds minimal calories to your food while increasing the amount of fiber, vitamins, minerals and antioxidants. reduction of risk factors, etc.	
Poppyseed	Its seeds are good source of thiamin, folate, and important minerals like calcium, iron, magnesium, manganese, phosphorus and zinc.	It also effective in paralysis, facial palsy, migraine, amnesia related problem. Its powder if taken with water is effective in treating hemorrhoids	

Table 2.
Uses and benefits of some common Indian spices.

3.1. Turmeric (Haldi)

- Turmeric grown in India, which accounts for 60% of the total area used as a spice and seasoning, belongs to the Zingiberaceae family, commonly grown in India and Southeast Asia.
- Known by various names such as Kunyit (Indonesian and Malay), Besar (Nepalese), and Haldi or Pasupu in some Asian countries.
- There are about 70 species of turmeric, 30 of which are found in India.
- Turmeric extracted from the rhizome of the turmeric plant accounts for the 96% of all turmeric extracted from this variety in India [8].
- The rhizome of turmeric contains 5% essential oil and the pigment it contains is known as curcumin.
- Curcumin has been used medicinally for many years due to its multiple pharmacological properties such as anti-inflammatory, anti-tumor and anti-angiogenic properties. "generally recognized as safe".
- According to the Food and Drug Administration (FDA), taking 12 g of curcumin per day was safe without toxic effects [9].
- It is used as a coloring agent in curry powder, meat dishes, egg dishes, pickles, cakes and rice. It is also used in lemon rice, sambar, dal, khadi, khihidi, and meat marinades.
- The most common adulteration of turmeric is methanil yellow or lead salt. India is the largest producer of turmeric spice and also an exporter to the US, UK and Japan. Curcuminoids are responsible for the yellow color and are found in 2-4% of turmeric.

❖ Uses and health benefits

- Curcuminoids are used as antioxidants due to the presence of phenolic bioactive compounds. Commonly used in food flavoring and coloring.
- The main uses of curry powder.
- Turmeric oleoresin is used as a substitute for pickles, gelatin, butter and cheese powders.
- Turmeric essential oil has antibacterial, antiseptic and antibacterial properties (due to sodium salts of curcumin and curcuminoids).
- Used as a blood purifier and antibiotic.

3.2. Cardamom (Elaichi)

- Cardamom, commonly known as *Elletaria cardamom*, belongs to the ginger family and is widely known as the queen of spices.
- Cardamom contains 2-10% essential oils that have a unique pleasant scent.
- The active ingredients found in the oil are cineole, terpinyl acetate, pinene, savin, and porneol. Used as flavoring in coffee, confectionery, cookies, bread, cakes and canned goods
- Cardamom is sometimes marketed after extracting its essential oil. All kinds of cardamom are used as a kitchen spice. In addition to the above uses, it can also help stimulate bloating and appetite in people with anorexia [10, 11].

❖ Uses and health benefits

- Green Cardamom is an essential ingredient in Indian sweets, puddings, yogurts and ice creams.
- For Chai Masala, a special hot tea drink, the overall shape is important.
- Supports digestion and prevents nausea and vomiting.

3.3. Cinnamon (Dalchini)

- Cinnamon (*Cinnamomum verum*), a member of the Lauraceae family, is the most commonly used spice in all households and is commonly grown in India, Sri Lanka, Bangladesh and Nepal [20].
- Cinnamon is obtained from the bark of the cinnamon tree.
- The active ingredients found in the bark and oil of 1% essential oil are eugenol, cineol and cinnamaldehyde.
- Used to make garam masala powder.
- Due to the presence of methylhydroxychalcone polymers, it also functions as an antioxidant. Cinnamon contains many important chemical constituents such as cinnamic aldehyde, cinnamic acid, and cinnamic acid, and has many promising health benefits, including:
- Using ginger and cinnamon stimulates blood circulation and digestion [24]

❖ Uses and health benefits

- Used as antipyretic, hypothermia, antiseptic, astringent, anti-inflammatory, carminative, perspirant, disinfectant, stimulant and stomachic.
- Cinnamon powder dissolved in water to relieve headaches and neuralgia.
- Considered a folk remedy for sclerosis (spleen, breast, uterus, liver, stomach) and tumors (especially abdomen, liver, tendons).

3.4. Coriander (Dhaniya)

- *Coriandrum sativum* L. (Apiaceae) is native to the Mediterranean region.
- It is best known for its fresh, characteristic spring scent. Coriander seed contains 0.5-1.0% essential oil with the active ingredient geraniol.
- Coriander leaves are rich in vitamin C (250 mg/100 g) and vitamin A (5,200 IU/100 g).
- Roasted and ground coriander is used as an ingredient in curry powder.
- It is used as a thickening agent and flavoring agent in cooking.
- Coriander is used in making pastries, synthetic syrups, and beverages. It also acts as a preservative when cooking meat.
- In the past, coriander was used effectively for digestive, respiratory, and urinary problems [16, 17].

❖ Uses and health benefits

- Seeds are chewed to correct the foul breath.
- An infusion of seeds is useful for flatulence, indigestion, vomiting & intestinal disorders eliminating symptoms related to female reproductive parts.
- Oleoresin (5%) used in flavoring beverages, pickles, sweets & other delicacies.
- Coriander is used for urethritis, cystitis, urinary tract infection, urticaria, rash, burns, sore throat, vomiting, indigestion, nosebleed, cough, allergies, hay fever, dizziness and amebic dysentery.
- The oil of coriander is used as antimicrobial property and as a natural fragrance in perfumery industry.

3.5. Clove (Laung)

- It is a small reddish flower bud of Myrtaceae of Myrtaceae.
- Indonesia is famous for its clove flower buds, which are used in cuisines around the world [18].
- In India it is grown in the Nilgiris, Tembasi Hills and Kanyakumari districts of Tamil Nadu and the Kottayam and Quilong districts of Kerala.
- The main component of essential oil is eugenol, and the oil content is about 15%.
- Clove oil is often used in Ayurvedic and Chinese medicine as a pain reliever for dental problems [19].
- Clove contains eugenol, which has antioxidant properties and prevents food from rancidity.
- Eugenol esters are used as fragrances. Due to its strong, pungent and pungent flavor, cloves are used as seasonings and food additives, especially in meats and baked goods.
- The taste of cloves can be combined with both sweet and savory dishes.
- Due to its antioxidant properties, it acts as a preservative.
- Widely used in bread masala, betel nut and chewing gum.
- Clove has been reported to have many benefits, including: [20, 21].

❖ Uses and health benefits

- Mainly used in many households as a tool to prevent minor disorders such as indigestion, flatulence and toothache.
- Clove is a very valuable medicine with digestive, stimulating, anti-flatulent and antiparasitic properties.
- Dried buds are used as an analgesic and anesthetic.
- Of all spices, cloves are said to have the highest antioxidant activity.
- Rich and mild taste.
- Used to flavor baked goods and confectionery and as a pickle in meat products.
- Clove bud oil is used in pharmaceutical and dental preparations.

3.6. Fenugreek (Methi)

- Common names for Fenugreek are Maithray (Bangla, Gujarati), Methi or Mithi (Hindi, Nepali, Marathi, Urdu, Sanskrit).
- Hard lentil seeds with a dark beige color and astringent aroma.
- It contains both soluble and insoluble fiber with 5% bitter fatty oil [26, 27].
- Because this spice has a bitter taste, it is used in small amounts in spices such as sambar and khadi. Improves the taste and shelf life of cucumbers.

❖ Uses and Health Benefits

- Fenugreek seeds have many medicinal benefits for indigestion, bronchitis, tuberculosis infections, skin irritation, ulcers and menopausal symptoms, and diabetes.
- Used to lower blood sugar levels.
- Used with buttermilk to treat dysentery.

3.7. Black pepper (Kali Mirch)

- It is a fruit of black pepper and belongs to the pepper family.
- Black pepper is used both as a spice and as a medicine.
- The hometown of pepper is Kerala in southern India.
- Kerala produces almost 95% of total pepper production.
- A small round dried fruit of a tropical vine with small white flowers.
- Pepper gets its pungent taste and flavor from the oleoresin present in the cells of the pericarp. Pepper (4-10%) is the main component of pepper responsible for the pungent taste of black pepper. Chavirine, pepolyzine, and piperetine are other alkaloids found in small amounts in pepper. Pepper seeds also contain crude fiber ranging from 8 to 18%.
- Paprika is an excellent source of manganese, iron, calcium, potassium, vitamins A, C, K, zinc, chromium and other nutrients. source of supply.
- Paprika has many medicinal properties, including antihypertensive, anti-Alzheimer's, antidepressant, antiplatelet, anti-inflammatory, antioxidant, antipyretic, antitumor, antiasthmatic, analgesic, and antibacterial agents.
- Also stimulates the secretion of hydrochloric acid in the stomach, thereby improving digestion.

❖ Uses and Health Benefits

- Used with hot milk for sore throat. Effective for rheumatoid arthritis, muscle pain, flatulence and headache.
- Peperine is believed to increase the bioavailability of other drugs by enhancing absorption and slowing metabolism.
- Ancient Indian home remedies prescribe pepper as a cure-all for relieving coughs and chest congestion.

3.8. Cumin (Jeera)

- Cumin is mainly grown in India, Syria, Iran and Turkey and belongs to the Apiaceae family.
- The largest producer of cumin is India (70% of the world's cumin production), and the second largest producer is Syria.
- The major importers of cumin for India are the United Arab Emirates, Central America, China and Vietnam.
- It contains 2-4% essential oil and the active ingredient is aldehyde cumino. The seeds are mainly used in curries and spices. It is also used in curry powder, sambar powder and rasam powder.

❖ Uses and health benefits

- Cumin warm water drinking rehydrate the human body and keep refresh.
- It help in digestive system by enhancing the saliva secretion.
- It improves the breast feeding in the lactating mother.
- Cumin seeds are used to lowers the blood sugar levels.
- It increases the hemoglobin level in the blood.
- Acts as a very good antioxidant spice due to the presence of anti-carcinogenic agents such as thymol and dithymoquinone.

3.9. Caraway

- Pleasantly aromatic, black dry seeds containing about 5% essential oil.
- The most important flavor substances are D-carvone and D-limonene.
- Its seeds are used to flavor cakes, biscuits, cheese, applesauce and biscuits.
- Because it is a fine powder, it is effective for early cataracts. Cumin oil has long been used as a beauty secret for women.
- A combination of black cumin and cumin seed oil has been used to kill parasites and worms, detoxify, and relieve amoebic dysentery, dysentery, abscesses, old tumors, stomatitis and rhinitis.

❖ Uses and health benefits

- Used as flavoring in food.
- It is mild stomach and carminative.
- Its seeds have digestive properties.

3.10. Asafoetida (Hing)

- Asafoetida, also known as the food of the gods, is native to Iran and Afghanistan.
- Asafoetida is an oleo-gum resin secreted from the rhizome or root of *Ferula asafoetida*.
- Asafoetida's flavor comes from the presence of ferulic acid esters and sulfated essential oils.
- A good source of protein, fiber, carbohydrates, calcium, phosphorus, iron, niacin, carotenes and riboflavin.
- Asafoetida is a common and readily available spice in every household and is effectively used to treat indigestion, menstrual cramps, earaches, body aches and toothaches.
- It is sold commercially with starch mixed in (compound hang) to dilute the strong flavor.

❖ Uses and Health Benefits

- Used as an antibacterial agent.
- Increases levels of detoxification enzymes in the body.
- Also used to treat chronic bronchitis and whooping cough.

3.11. Bay leaf (Tej Patta)

- Laurel leaves (*Laurus nobilis*) belong to the Laurel family and are native to the Mediterranean and Asia.
- It is made from dried fragrant bay leaves and contains 1-3% aromatic oil.
- Its oil is used to make pickle spices and flavor vinegar.
- The dried leaves are mainly used to flavor meats, plough, soups, fish, tomato cucumbers and bilinge candies.

❖ Uses and Health Benefits

- Used as a flavoring agent in curry dishes.
- Bay leaves and fruits have stimulant and narcotic properties.
- Bay leaves are useful for joint, breast, uterine and stomach pains.
- Stimulates the stomach and aids digestion.

3.12. Poppy seed

- It is a small kidney-shaped oilseed derived from the poppy (*Papaver somniferum*).
- Poppies are now legally grown and used in many countries, mainly in Central Europe [20].
- Its seeds are an excellent source of thiamine, folic acid, and important minerals such as calcium, iron, magnesium, manganese, phosphorus, and zinc. , used whole or ground as an ingredient in many foods.

❖ Uses and Health Benefits

- Poppy seeds are used as a thickening agent to add flavor to recipes.
- Commonly used to prepare korma ground poppy seeds with coconut.
- Used in traditional Indian medicine as a skin moisturizer.
- Poppy seed oil is a valuable commercial oil with a variety of culinary, industrial and medical uses.

4. USE OF SPICES FOR HEALTH BENEFITS DURING COVID-19 PANDEMIC

- ✓ Coronavirus disease (COVID-19) has been declared a pandemic by the World Health Organization.
- ✓ The disease affects people of all ages, mainly elderly patients suffering from diabetes, hypertension, stroke, chronic bronchitis, Parkinson's disease, chronic obstructive pulmonary disease, cardiovascular disease, and cancer. influenced [29, 30].
- ✓ People can easily or severely lose their immunity if they are COVID-19 positive, leading to widespread demand for natural immune boosters such as spices and herbs.
- ✓ Spices are known for their high antioxidant and antimicrobial activity due to the presence of many bioactive compounds such as flavonoids, phenolic compounds, sulfur-containing compounds, tannins, alkaloids, phenols and diterpenes [31, 32].
- ✓ After reviewing the spice's role as an immune booster, even the Ministry of AYUSH decided that Gov.
- ✓ The Indian government has issued guidelines on self-care methods to boost immunity during the COVID-19 pandemic. The guidelines highlight the use of spices such as turmeric, cumin, coriander and garlic that are recommended for cooking.
- ✓ The guidelines also recommend using herbal teas or decoctions (kadha) of basil, cinnamon, black pepper, ginger and raisins once or twice daily.
- ✓ You can also drink 150ml of hot milk with half a teaspoon of turmeric powder once or twice a day.
- ✓ Some spices such as cloves, cinnamon, ginger, black pepper and turmeric have been used as immune boosters along with their antiviral properties [33, 34].

5. CONCLUSION

- ✓ Spices, commonly used in a variety of foods, contain a wide range of biologically have a function.
- ✓ Health benefits are expected for our bodies in many common ailments such as coughs, colds, fevers, headaches, gastrointestinal upsets and cancer.
- ✓ Foods that are high in carbohydrates but contain a variety of essential minerals.
- ✓ In the current Covid-19 pandemic situation, spices such as turmeric, ginger, cloves, pepper, cinnamon and cardamom are used in a variety of ways such as kada, herbal teas and masala teas.
- ✓ It is widely used in food formulations and plays an important role in containing or reducing the effects of this virus.
- ✓ After reviewing this chapter, you can apply the right spices to the right conditions and benefit from their amazing functions, medicinal and nutritional properties.

6. REFERENCES

- [1]. Manay N, Shadaskarswamy, M. Foods, facts and principles. New age international Pvt Ltd., New Delhi. 1999; 321-334.
- [2]. Khanum F, Krishna SKR, Semwal AD, Vishwanathan KR. Proximate composition and mineral contents of spices. The Indian Journal of Nutrition and Diet. 2001; 38 (3): 93 - 96
- [3]. Sachan AK, Doli RD, Kumar M. Carum carvi-An important medicinal plant. Journal of Chemical and Pharmaceutical Research. 2016; 8(3): 529-533.
- [4]. Khajehdehi P. Turmeric: Reemerging of a neglected Asian traditional remedy. Journal of Nephropathology. 2012; 1(1): 17-22.
- [5]. Maqsood S, Singh P, Samoon MH, Munir K. Emerging role of immunostimulants in combating the disease outbreak in aquaculture. International Aquatic Research. 2011; 3: 147-163.
- [6]. Ravindran PN, Nirmal Babu K, Sivaraman K. The Golden Spice of Life. In: Turmeric. The Genus Curcuma. Boca Raton, FL, USA: CRC Press; 2007, 1-14.
- [7]. Szallasi A. Piperine: Researchers discover new flavor in an ancient spice. Trends in Pharmacology Science. 2005; 26(9): 437-439.
- [8]. Chattopadhyay I, Biswas K, Bandyopadhyay U, Banerjee RK. Turmeric and curcumin: Biological actions and medicinal applications. Current Science of India. 2004; 87:44-53.
- [9]. Gupta, S. C., Patchva, S., & Aggarwal, B. B. (2013). Therapeutic roles of curcumin: Lessons learned from clinical trials. The American Association of Pharmaceutical Scientists Journal, 15(1), 195–218.
- [10]. Jafri MA, Farah, Javed K, Singh S. Evaluation of the gastric antiulcerogenic effect of large cardamom (fruits of *Amomum subulatum* Roxb). Journal of Ethnopharmacology. 2001; 75(2–3):89-94.
- [11]. Duke JA, Bogenschutz-Godwin MJ, deCellier J, Duke PK. *Elettaria cardamomum* Maton (Zingiberaceae) Cardamon, Malabar or Mysore cardamon, in CRC Handbook of Medicinal Spices. 2003; 120-138.
- [12]. Benavides GA, Squadrito GL, Mills RW, Patel HD, Isbell TS, Patel RP, Darley-Usmar VM, Doeller JE, Kraus DW. Hydrogen sulfide mediates the vasoactivity of garlic. 2007; PNAS. 104: 17977-17982.
- [13]. Agrawal M, Walia S, Dhingra S, Khambay BPS. Insect growth inhibition antifeedant and antifungal activity of compounds isolated derived from *Zingiber officinale* roscoe, ginger rhizome. Pest Management Science. 2001; 57: 289-300.
- [14]. Kikuzaki H, Kobayashi H, Nakatani N. Constituents of Zingiberaceae, diarylheptanoids from rhizomes of *Zingiber officinale*, Phytochemistry. 1991; 30: 3947-3952.
- [15]. Sachan AK, Doli RD, Senah LD, Shuaib, M. *Asparagus racemosus* (Shatavari): An overview. International journal of pharmaceutical and chemical sciences. 2012; 1(3) 588-592.
- [16]. Gilani AH, Bashir S, Khan AU. Pharmacological basis for the use of *Borago officinalis* in gastrointestinal, respiratory and cardiovascular disorders. Journal of Ethnopharmacology. 2007; 114:393- 399.
- [17]. British pharmacopoeia, Introduction General Notices Monographs, medicinal and Pharmaceutical, British pharmacopoeia commission, London. 2003; Volume-1 (A-I); 542-543.
- [18]. Duke JA, Bogenschutz-Godwin MJ, deCellier J. Duke PK. *Syzygium aromaticum* (L.) Merr. and L. M. Perry (Myrtaceae) Clavos, Clove, Clovetree, in CRC Handbook of Medicinal Spices. CRC Press, Washington DC. 2003, 281.
- [19]. Daniel AN, Sartoretto SM, Schmidt G, Caparroz-Assef SM, Bersani-Amado CA, Cuman RKN. Anti-inflammatory and antinociceptive activities of eugenol essential oil in experimental animal models. Revista Brasileira de Farmacognosia. 2009; 19: 212- 217.
- [20]. Bhat KS, Vivek K. Biocidal potential of clove oils against *Aedes albopictus* – A comparative study. African Journal of Biotechnology. 2009; 8 (24):6933-6937, 15.
- [21]. Delaquis PJ, Stanich K, Girard B, Mazza G. Antimicrobial activity of individual and mixed fractions of dill, cilantro, coriander and eucalyptus essential oils. International Journal of Food Microbiology. 2002; 74(1–2): 101-109.
- [22]. Khan A, Safdar M, Khan AMM, Khattak KN, Anderson RA. Cinnamon improves glucose and lipids of people with type 2 diabetes. Diabetes Care. 2013; 26 (12): 215- 218.

- [23]. Bajpai M, Pande A, Tewari SK, Prakash D. Phenolic contents and antioxidant activity of some food and medicinal plants. *International Journal of Food Science and Nutrition*. 2005; 56 (4): 287-291.
- [24]. Doli RD, Sachan AK, Vishnoi G, Shuaib Mohd, Imtiyaz Mohd. A review on surveillance of herbal medicines. *International Journal of Phytopharmacology*. 2016; 7(2): 68-72.
- [25]. Al-Zuhair H, El-Sayeh B, Ameen HA, Al-Shoorah H. Pharmacological studies of cardamom oil in animals. *Pharmacological Research*. 1996; 34(1-2): 79-82
- [26]. Basu SK, Acharya SN, Thomas JE. Application of phosphate fertilizer and harvest management for important fenugreek (*Trigonella foenum-graecum* L.) seed and forage yield in a dark brown soil zone of Canada. *KMITL Science and Technology Journal*. 2008; 8(1): 1-7.
- [27]. Hardman R, Fazli FRY. Methods of screening the genus *Trigonella* for steroidal saponin. *Planta Medica*. 1972; 21: 131-138.
- [28]. Cheung SC, Szeto YT, Benzie IF. Antioxidant protection of edible oils. *Plant Foods Human Nutrition*. 2007; 62 (1): 39-42.
- [29]. Deng SQ, Peng HJ. Characteristics of and public health responses to the coronavirus disease 2019 outbreak in China. *Journal of Clinical Medicine*. 2020; 9: 575.
- [30]. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Gu X. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020; 395(10223): 497-506.
- [31]. Patra K, Jana K, Mandal DP, Bhattacharjee S. Evaluation of the antioxidant activity of extracts and active principles of commonly consumed Indian spices. *Journal of Environmental Pathology, Toxicology and Oncology*. 2016; 35: 299-315.
- [32]. Yashin A, Yashin Y, Xia X, Nemzer B. Antioxidant activity of spices and their impact on human health: A review. *Antioxidants*. 2017; 6:70.
- [33]. Shrivastava R. Immunity boosters: Solutions from nature-herbs and spices. *Journal of Renal Nutrition Metabolism*. 2020; 6: 35-37.
- [34]. Srivastava AK, Chaurasia JP, Khan R, Dhand C, Verma S. Role of medicinal plants of traditional use in recuperating devastating COVID-19 situation. *Medicinal Aromatic Plants (Los Angeles)*. 2020; 9: 359.