

ROLE OF COMMONLY USED ASIAN SPICES IN BOOSTING IMMUNITY AGAINST INFECTIOUS AGENTS

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ABSTRACT:

Spices are normally used for adding flavour to the food. Especially Asians use a variety of spices or spice blends to make food aromatic, hot, savoury and sweet. Spices not only add aroma to the food but also come with notable nutritional values and give a lot of health benefits. The spices that are typically used in Asian cuisine are Cinnamon, garlic, cloves, cumin, basil, star anise, galangal, ginger, coriander, turmeric, cilantro, pepper, ajowain etc. The main aim is to try and understand the role of commonly used Asian spices on boosting immunity against infectious agents. A large number of plants are used to treat many diseases as they possess antimicrobial activity. However, Challenges include Extinction or disappearance of a few indigenous varieties, Low productivity, Insufficient quantities of quality species and Poor product quality. Many people do not know the importance of spices and its effect on the immune system. There is a need to understand the traditional systems, to help visualise the future better. There is a necessity to link the past and the present of medicine. This can help in giving new directions for a better understanding of different diseases etc. As this is a review various other related research articles are acquired using the Search engines such as PubMed, google scholar, google Cochrane databases and MESH. Their data is taken as the base for our study.

KEYWORDS: antimicrobial; herbal medicine; immunity; Spices; traditional foods.

INTRODUCTION:

Spices not only add aroma to the food but also come with notable nutritional values and give a lot of health benefits. Generally, south Indian food contains a hugely unique combination of spices. Indians use spice systematically for many purposes such as everyday cooking. It can be considered as an ancient tradition. Spices provide an excellent preventive measure to ward off many diseases and strengthen the immune system (Ashwin and Muralidharan, 2015). There are many recommendations that warranted the support of consumption of foods rich in herbs and spices. (Girija *et al.*, 2019). There was also tremendous interest and research in the health-promoting and protective properties of herbs and spices. (Shahana and Muralidharan, 2016). There are reports available that state, some bacteria strains are sensitive towards many spices which are used in food preparation (Marickar, Geetha and Neelakantan, 2014). Spices and herbs are the most natural medicinal methods. Herbs are considered as powerful healing agents. However, they contain active ingredients that can interact negatively with other medications or remedies (Vaishali

and Geetha, 2018). Some research shows that traditional food (containing Asian spices) are important to the body and helps in boosting immunity. Bay leaf is derived from a shrub (Laurel) and is frequently used as a spice in the Mediterranean lands and is considered as a traditional medicine for the treatment of several diseases (M, Geetha and Thangavelu, 2019) (Selvakumar and Np, 2017)

These kinds of traditional foods are also called as functional foods containing spices which are products of plants with active compounds and are important for human health and help in reducing risks of chronic diseases(Shahzan *et al.*, 2019). Due to increasing microbial drug resistance, there is a need to find other methods to treat infectious diseases . for eg: Microbes like Staphylococcus, Pseudomonas, A. baumannii (Ab) etc are considered a major cause of hospital-acquired infections and is caused due to increasing drug resistance, the reasons being unique virulence factors that help the pathogen to survive stress etc (Girija As and Priyadharsini J, 2019) (Girija, Jayaseelan and Arumugam, 2018) (Priyadharsini *et al.*, 2018b) (Priyadharsini *et al.*, 2018a; Smiline, Vijayashree and Paramasivam, 2018). There have also been increasing interests on the effect of medicinal plants for the treatment of hepatitis B. More than two billion people have been infected with HBV and many people die every year especially from cirrhosis and carcinoma due to limited availability of drugs for treatment (Pratha, Ashwatha Pratha and Geetha, 2017) (Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020).

Infection and Immunity

The immune system of an individual is designed to defend against millions of bacteria, viruses, fungi, toxins and parasites. The system is very complex, made up of several types of cells and proteins that have different jobs to do in fighting against foreign invaders. Immunity is a balanced state of organisms' biological defences to fight infection, disease or any other kind of biological invasion. Through a series of steps called the immune response, it attacks organisms and substances that invade body systems and cause disease. It is made up of a network of cells, tissues, and organs that work together to protect the body. The cells involved are white blood cells or leukocytes which are produced and stored in many locations in the body, including the thymus, spleen, bone marrow and lymph nodes. The leukocytes circulate through the body between the organs and nodes via lymphatic vessels and blood vessels. In this way, the immune system works in a coordinated manner to monitor the body for germs or substances that might cause problems.

Spices and Immunity

Immunity plays an important role in defending against various emerging and seasonal outbreaks of infections like cold. Boosting our innate immunity is the best way to stay healthy. Many herbs and spices have immunomodulating properties. Spices have many roles to play. for eg: it can provide aroma and sometimes a delicious flavour to the food but most importantly they have a role in digestive function. They are also used mainly to treat and prevent various diseases such as cardiovascular, neurodegenerative diseases. It helps in improving the immune system and also gastrointestinal health. (Devarajan and Mohanmarugaraja, 2017) . some herbs and spices (aromatic, pungent smell) can have significant oxidative effects (Polovka and Suhaj, 2010). Spices are added into food not only to increase/change the flavour but are also used to provide different kinds of antimicrobial property. (Nevas *et al.*, 2004).

COMMONLY USED ASIAN SPICES :

Pepper: Black pepper (*Piper nigrum L.*) is a flowering vine of the Piperaceae family mainly cultivated for its fruit, which is dried and used as spice and seasoning. It is native to South India and known as King of Spices. Pepper gets its spicy heat mostly from the piperine compound which is found both in the outer fruit and in the seed. Piperine is the chief chemical constituent responsible for antimicrobial activity. Various pharmacological activities such as anti-bacterial, antimycotic, analgesic, antipyretic, anti-

inflammatory, anti-convulsant, CNS depressant, antimutagenic, antioxidant, anti insecticidal, synergistic have been reported. Black pepper has both pro-inflammatory and anti-inflammatory properties Pepper also has potential decreasing in obesity by increasing thermogenesis and fat oxidation. (Westerterp-Plantenga *et al.*, 2006) Piperine increases the absorption of selenium, Vitamin B12, β -carotene, and curcumin, as well as other compounds. Thus it is an understudy for a variety of possible physiological effects (Srinivasan, 2007). It helps in reducing the amount of high fat induced oxidative stress cells .(Vijayakumar, Surya and Nalini, 2004) . black pepper can be used for many purposes such as pain relief , rheumatism , flu , normal cold etc its considered as an antimicrobial agent .

Clove : Clove (*Syzygium aromaticum*) is used as a natural form of antiviral , antifungal and antimicrobial agent .The medieval uses of clove are seen in diseases such as cholera . It is considered as an effective treatment. Clove also helps in boosting the digestive system (Jirovetz *et al.*, 2006) .Many oils can be derived from this particular spice and these oils have medicinal purposes . A few examples are eugenol , phenylpropanoids etc (Gulcin, 2004; Crini and Lichtfouse, 2019).Clove shows antimicrobial property .aqueous extract of concentration 3% was very effective in inhibiting microbial action 1% extract was also very effective(Sofia *et al.*, 2007) powerful antioxidant activity of clove extracts is due to the strong hydrogen donating ability, metal chelating ability etc (Gulcin, 2004; Sofia *et al.*, 2007). Clove oil could be employed as suppressor of potato tuber germination by affecting the lipid peroxidation and the enzyme activity of catalase, glutathione-S-transferase, peroxidase, polyphenol oxidase and superoxide dismutase etc.(Afify *et al.*, 2012)

Cinnamon : Cinnamon (*Cinnamomum zeyeanicum*) is one of the spices that have the highest antibacterial activity .cinnamon extract (300 mg/day) decreased insulin resistance in fructose-fed diabetic rats, by increasing insulin and activating NO pathway in skeletal muscle(Qin *et al.*, 2003). If there is an imbalance of T cells in the body cinnamon can effectively increase its number .One of the most potential ability of cinnamon is its ability to lower blood glucose level in patients .cinnamon oil possesses antimicrobial action in the range 10-150 μ g ml thus it can inhibit the action of different kinds of bacteria on food products (Muthuswamy, Rupasinghe and Stratton, 2008).Chinese cinnamon combined with double-linked polyphenol type-A polymers (500 mg/day) will help reduce blood pressure, and fasting blood glucose concentrations(Ziegenfuss *et al.*, 2006).

Garlic : Garlic (*Allium sativum* Linn.) has an important dietary and medicinal role for centuries.It is incredibly nutritious with low calorie and rich in Vitamin C, Vitamin B6 and manganese.n It has beneficial effects on the cardiovascular system. It is also known for its antimicrobial, anticancer, anti-inflammatory, hypoglycemic, and hormone-like effects. Garlic supplements are proven to reduce total and LDL cholesterol without affecting the HDL cholesterol level. Garlic extracts have been used to treat infections for thousands of years. Its typical pungent odor and antibacterial activity depend on allicin, which is produced by enzymatic (alliin lyase) hydrolysis of alliin after cutting and crushing of the cloves.Garlic possess very effective antibacterial activity and is used to treat different kinds of clinical pathogens (Karuppiah and Rajaram, 2012) .It is used in the treatment of hyperlipidemia , some kinds of cancer , infectious diseases and heavy metal intoxications (lead etc) (Abdullah *et al.*, 1988). Garlic has the properties strengthening the immune system and also acts as an antioxidant . (Goncagul and Ayaz, 2010).

Cardamom : (*Elettaria cardamomum*) Cardamom extracts also exert pro-inflammatory roles just like pepper .Cardamom was tested on rats and successively reduced blood pressure by using cholinergic and calcium antagonistic mechanisms(Gilani *et al.*, 2008). Cardamom contains chemical constituents such as

proteins , minerals , lipids, flavonoids , terpenoids , carotenoids (Ashokkumar *et al.*, 2020). One of the cardamom extracts is its oil that has an anti - spasmotic action . (Al-Zuhair, 1996)

Star anise: *Illicium verum* belonging to the Magnoliaceae family, commonly known as Chinese star anise is one of the flavors used in China. *I. verum* fruits have traditionally been used as flavors. Star anise is one of many spices that contain bioactive compounds as well as a number of phenolic and flavonoid compounds, having antioxidant, preservative, and antimicrobial properties. Star anise has carminative, antispasmodic, antiseptic, antimicrobial, antidiarrheal activities and is used to treat colics and as a tranquilizer. Researchers attribute these effects to the presence of two coumarin derivatives: 7-hydroxycoumarin and 7-methoxycoumarin. However, star anise also contains a dicycloether, and anethole, both of which have antimotility activities. However, the consumption of high amounts of star anise tea may cause neurotoxicity and hepatotoxicity. Modern pharmacology studies demonstrated that its crude extracts and active compounds possess wide pharmacological actions, especially in antimicrobial, antioxidant, insecticidal, analgesic, sedative, and convulsive activities. In addition, it is the major source of shikimic acid, a primary ingredient in the anti-flu drug (Tamiflu)

Cumin : (*Cuminum cyminum*) Cumin oil also called di -Homo - linoleic acid is used as a powerful antioxidant agent (Ibrahim *et al.*, 2014). The use of cumin plants can extend to the treatment of asthma , diabetes , inflammation , and hypertension etc (Amin and Hosseinzadeh, 2015). The composition of cum is oil , proteins , carbohydrates , vitamins , minerals etc. Cumin's distinctive flavor is because of its crucial oil content. Cuminaldehyde, cymene, cuminic alcohol, and terpenoids are the principal volatile components of cumin . (Singh, Gangadharappa and Mruthunjaya, 2017)

CONCLUSION :

The above review has covered some commonly used flavouring agents and its role in boosting the immune status. Increase in the knowledge of spices and its properties can be used to treat many disease. Also there are very good chances that the use of spices might help in solving the escalating levels of antibiotic resistance of the pathogenic microorganisms. More detailed research into spices can lead to a possibility of deriving new knowledge on mechanism of action and thus, may help in understanding the course of diseases. If research on spices are further advanced, it might lead to the discovery of a new potential method to treat different ailments. Thus, in conclusion, commonly used Asian spices have a very important role in boosting the immunity against infectious agents. They help in preventing various chronic diseases and optimize health. They help in reducing health care costs. This can be considered as an effective way, thus improving the quality of life .

AUTHOR CONTRIBUTIONS :

Kethan Umakanth :

1. Execution of the work
2. Data collection
3. Drafting of manuscript

RV Geetha :

1. Concept and design of study.
2. Validation of the data collection.
3. Revision and proofreading of the review.

Smiline Girija AS :

1. Validation of the data collection.
2. Revision and proofreading of the review.

CONFLICT OF INTEREST : There is none to declare.

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