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Indian traditional herbal ingredients as functional food: An overview

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Abstract

The rich culinary tradition of India has always viewed the role of food as therapeutic. Role of food is not restricted to providing nutrition but food is seen as one of the most important components of overall well-being. The science behind traditional Indian food has been passed on orally over generations and thus has preserved its authenticity. Various herbs and spices have been a prominent component of Indian traditional food since time immemorial. While these herbs and spices definitely act as taste enhancers, the role played by such herbs and spices is nothing short of medicinal. They provide added health benefits or remedy from certain diseased condition and provide the body with beneficial ingredients. This is an overlap of the definition of functional food and properties of herbs and spices used in traditional Indian food.

Keywords: ITF, traditional, herbal, ingredients, various

Introduction

Indian Traditional Food (ITF) goes beyond taste and has definitive focus on health. Majority of components of the Indian traditional food are nutritious and have a therapeutic effect. Therefore, it could be said that the role of food has never been restricted to providing nutrients but has extended well beyond that function since time immemorial. Moreover so, ITF has, with the passage of time, achieved a desirable balance of ingredients which is nothing short of scientific. The ingredients not only enhance the culinary experience but also have been proven to act as medicines for various ailments. The health benefits of ITF may range from ensuring normal physiological functions in the body such as improving gastrointestinal health, enhancing the immune system, weight management, and providing better skeletal health, among others, in order to reduce blood cholesterol, oxidative stress, the risk of cardiovascular diseases, inflammatory diseases, various types of cancers, and possible prevention of diabetes, and neurodegenerative diseases ^[1].

Food in Indian Culture: A Brief History

With a country as diverse as India, along with the dialect, food habits too change with every few kilometers. However, the functional and medicinal properties of food remain intact. This has been the case since ancient times. As far back as to the times of Bhagavadgita, Ramayana, and Manusmriti, every community that lived in India had a clear and separate food belief system ^[2]. In the Aryan belief system, food was considered a source of strength and a gift from God ^[3].

In comparatively modern times too, the importance of food has been delineated in much comprehension and enhanced importance. The Indian treatise on medicine *Sushruta Samhita*, in Chapter Sutrasthana, observes –

“...food determines the origin of beings and forms the chief source of their bodily strength and complexion, as well as of the albuminous (Ojas) principle in their organisms.... Life is

¹ Srinivasan, K. (2010). Traditional Indian Functional Foods, Functional Foods of the East, pp. 51-84

² Sarkar, P. *et al.* (2015). Traditional and Ayurvedic Foods of Indian Origin, Journal of Ethnic Foods, 2(3), 97-109

³ K.T. Achaya, Indian Food: A Historical Companion, Oxford University Press, Delhi (1994)

impossible without food. Food is the source of the growth, strength, and healthful glow of organic beings. It is food that imparts strength to the organs of sense and makes them operative in their respective fields of action. It is irregularity (Vaishamya) of diet which brings about ill-health..."^[4].

Therefore, the importance of food in Indian tradition is second to none. Food is viewed not only as an item of nourishment but of nurturing. Thus, the ingredients of food have been decided with utmost precision and care. These ingredients are nothing short of items that are known as functional foods in the modern times. Though the impact of herbal ingredients in ITF is prominent, there are few herbs which are so commonly used that these are household names. This paper will try to analyze the benefits derived from such widely used herbal ingredients which elevates the status of such herbal ingredients of functional food.

Medicinal Plants as Functional Food:

The role of various medicinal plants has been prominent in Indian traditional food. Though medicinal plants and leaves are seen by many as 'taste enhancers', the role of such plants and leaves is highly therapeutic. There are many plants in India which are used in everyday food, the accumulated impact of which is medicinal. The traditional Indian diet believes in the theory of 'Food as Medicine'. Though there are numerous examples of herbs, seeds and plants with significant medicinal properties consumed as part of the daily diet, here we will be discussing some of them which are most commonly used. The herbs and plants discussed here form a part of everyday Indian diet and thus provide a regulated delivery of medicinal compounds to the body on a daily basis.

Tulsi: *Ocimum sanctum* Linn, commonly referred to as Tulsi in India is a household name in India and holds a place of traditional reverence in Indian culture. This commonly found medicinal plant has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint, and exposure to cold and excessive noise^[5]. Some of the well-known medicinal properties of Tulsi include – antibacterial, antifungal, antipyretic, antioxidant, antiseptic and anticancer^[6]. Of the five domesticated subtypes of Tulsi, there is significant concentration of eugenol (anti-infective) and ursolic acid (anti-cancer) in both the leaf and stem of at least two subtypes^[7]. The therapeutic importance of Tulsi is such that, within Ayurveda, Tulsi is known as the "Incomparable One," "Mother Medicine of Nature" and "The Queen of Herbs"^[8].

Curry Leaves: *Murraya koenigii*, more commonly known as 'curry leaves' in the Indian sub-continent, is a significant part of diet in the sub-continent. Though the primary use of 'curry leaves' is seen as a taste enhancer, it encapsulates a host of medicinal properties. A queen jewel in the crown of

'Ayurveda', curry leaves or 'krishnanimba' is used as antihelminthics, analgesics, digestives, and appetizers in Indian cookery^[9]. Additionally, the presence of different carbazole alkaloids and other important metabolites, like terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid significantly enhance the medicinal properties of *Murraya Koenigii*^[10]. It is interesting to note that pure compounds and crude organic extracts of leaves of *Murraya Koenigii* have been screened for some pharmacological activities and found to possess anti-diabetic, cholesterol reducing property, anti-diarrhea activity, cytotoxic activity antioxidant property, antiulcer activity antimicrobial, antibacterial potential and many more useful medicinal properties^[11].

Turmeric: *Curcuma longa* (Turmeric) is a perennial plant which grows in India, China, Indonesia and various other tropical countries. Especially in India, turmeric is a common component of everyday food. Apart from being used as a spice and for the purposes of food coloring, turmeric has a host of health benefits. The most important therapeutic component of turmeric is a polyphenol found in turmeric known as 'curcumin'. Curcumin, the primary yellow biocomponent of turmeric has beneficial properties such as antioxidant, anti-inflammatory, and anti-cancer properties. Additionally, curcumin also has antidiabetic, antibacterial, antiprotozoal, antiviral, antifibrotic, immunomodulatory, and antifungal properties^[12]. Other benefits of regular use of turmeric in diet include improvement of brain function, and control of obesity and diabetes^[13] Turmeric has medicinal uses in a host of conditions including indigestion, flatulence, poor circulation, cough, amenorrhea, chest pain, blood urine, skin disorders, hemorrhage, diabetes, arthritis, anaemia among others^[14] Scientific research suggests that regular use of turmeric not only purifies blood (rakta dhatu shuddhi), but also warms it and stimulates formation of new blood tissue (rakta dhatu vardhaka)^[15].

Aswagandha: *Withania somnifera* popularly known as Aswagandha or Indian Ginseng/Poison Gooseberry has been a very important component of the Indian traditional medicine. The recorded history of Aswagandha being used as a traditional medicine dates back centuries. Apart from its other medicinal benefits recognized in the modern times, Ayurveda uses root of this plant as general health tonic, adaptogenic, nootropic, immunomodulatory etc.^[16]. Moreover, modern medicine suggests that the root of the Ayurvedic drug W.

⁹ Balakrishnan, R. *et al.* (2020). Medicinal Profile, Phytochemistry, and Pharmacological Activities of *Murraya koenigii* and Its Primary Bioactive Compounds, *Antioxidants* (Basel). 9(2): 101.

¹⁰ Id.

¹¹ Handral H.K., Pandith A., Shruthi S.D (2012). A review on *Murraya koenigii*: Multipotential Medicinal Plant, *Asian Journal of Pharmaceutical and Clinical Research*; 5:5–14.

¹² Shukry, M. *et al.* (2021). Curcumin, the active substance of turmeric: its effects on health and ways to improve its bioavailability, *Journal of the Science of Food and Agriculture*; 101(14):5747-5762

¹³ Takanori, T (2018). Curcumin as a functional food-derived factor: degradation products, metabolites, bioactivity, and future perspectives, *Food & Function*, 21;9(2):705-714.

¹⁴ Bawa, A.S. *et al.* (2013). Herbal Ingredients for Functional Foods – An Overview, *Indian Food Industry Magazine*, Vol 32 No 1, 42-49

¹⁵ Id.

¹⁶ Neeraj, T. Yadav, SS. (2020). Safety and Clinical Effectiveness of *Withania somnifera* (Linn.) Dunal Root in Human Ailments, *Journal of Ethnopharmacology*, Volume 255, June 2020, 112768

⁴ Sushruta Samhita as translated by Kaviraja Kunja Lal Bhishagratna, Volume 1: Sutrasthana, 1907

⁵ Cohen, MM (2014). Tulsi-Opium Sanctum: A Herb for All Reasons, *Journal of Ayurveda and Integrated Medicine*, Oct-Dec; 5(4): 251–259.

⁶ Prasad, R (2016). Medicinal Properties of Tulsi Unravelling, *The Hindu*, available on: <https://www.thehindu.com/sci-tech/health/medicinal-properties-of-tulsi-unravelling/article7593813.ece>

⁷ Id.

⁸ Cohen, MM (2014). Tulsi-Opium Sanctum: A Herb for All Reasons, *Journal of Ayurveda and Integrated Medicine*, Oct-Dec; 5(4): 251–259.

somnifera (Aswagandha) appears promising, safe and effective medicine for management of schizophrenia, chronic stress, insomnia, anxiety, memory/cognitive enhancement, obsessive-compulsive disorder, rheumatoid arthritis, type-2 diabetes and male infertility, and bears fertility promotion activity in females adaptogenic, growth promoter activity in children and as adjuvant for reduction of fatigue and improvement in quality of life among cancer patients undergoing chemotherapy [17].

Chili: Chili is a major ingredient of various cuisines all over India. The medicinal impact of Chili has received significant focus in the recent times and research points out towards the immense therapeutic effects of chili. The substance of interest in such research is Capsaicin, the primary bioactive substance in red chili peppers, primarily responsible for producing the pungent flavor. The major biological efficacies of capsaicin include analgesic, antioxidant, anti-inflammatory, anti-cancer, anti-obesity, cardio-protective, and metabolic modulation effects [18]. The various beneficial health properties of chili are due to the presence of variety of bioactive components, such as carotenoids, capsaicinoids, and vitamins in abundance. Particularly, carotenoids have important nutraceutical properties and several studies have focused on their potential in the prevention and treatment of human diseases [19].

Kalonji: Kalonji, scientifically known as *Nigella sativa* is a plant native to south and southwest Asia. It is very popular in various traditional medicines such as Unani and Tibb [20], Ayurveda and Siddha [21]. Widely used as a medicinal plant, the use of Kalonji has seen a recent spike in everyday use because of its numerous benefits. The essential oils extracted from Kalonji exhibit different biological activities including antifungal, antibacterial and antioxidant potentials. Moreover, research shows that *Nigella sativa* essential oil demonstrated complete inhibition zones against different Gram-negative and Gram-positive bacteria including *Penicillium citrinum*, *Bacillus cereus*, *Bacillus subtilis*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The essential oil also shows stronger antioxidant potential in comparison with synthetic antioxidants [22].

Black Pepper: Considered as the ‘King of Spices’, *Piper nigrum* (commonly known as black pepper) is used as a medicinal product in addition to its flavor-enhancing properties. Black pepper is an important health food due to its antioxidant, antimicrobial potential and gastro-protective modules. Scientific research has proven that the key alkaloid components of black pepper, that is, piperine assists in cognitive brain functioning, boost nutrient's absorption and

improve gastrointestinal functionality [23]. Other medicinal properties of black pepper include antioxidant, antimicrobial, anti-inflammatory, gastro-protective, and antidepressant activities [24]. Moreover, recent research has also indicated towards the promising effects of black pepper to treat airway disorders especially bronchitis and asthma [25].

Garlic: Garlic (*Allium sativum*) is a common ingredient of food in the Indian cuisine. It has been used in the Indian sub-continent, for thousands of years, as a food and for medicinal purposes. The purported health benefits of garlic are numerous, including, anticarcinogenic, antibiotic, anti-hypertensive, and cholesterol-lowering properties, the risk of cardiovascular disease lowering the effects of hypolipidemic, antithrombotic, anti-diabetic, and anti-hyperhomocysteinemia and antioxidant, antimicrobial, immunomodulatory, antiasthmatic, antimutagenic, and prebiotic activities [26]. Allicin, the main active chemical constituent in garlic, together with other organosulfur compounds have been tested positively for their antioxidant property, anticarcinogenic property and antimicrobial property as well as their successful prevention of cardiovascular diseases, diabetes mellitus, high blood cholesterol levels [27]. The anti-cancer properties of garlic has also generated significant interest in the scientific community about this functional food. Research suggests that garlic bioactive compounds may prevent cancer through mechanisms such as inducing cell cycle arrest, promoting apoptosis, and inhibiting angiogenesis in different cancer cells.²⁸

Ginger: Ginger (*Zingiber officinale*) as a herb is used widely throughout the world in culinary habits. There is abundant scientific proof pointing out towards the antioxidant, antimicrobial, and anti-inflammatory potential of ginger along with anticancer, immunonutrition, antioxidant and cardiovascular cure potential [29]. The major bioactive constituents in ginger are the gingerols. Gingerols are the major pungent compounds present in the rhizomes of ginger which exhibit a host of biological activities, ranging from anticancer, anti-oxidant, antimicrobial, anti-inflammatory and anti-allergic to various central nervous system activities. These properties of ginger could provide valuable protection against diabetes, cardiac and hepatic disorders [30].

Clove: Cloves (*Syzygium aromaticum*) are the dried flowers of the clove tree. Though it is native to China, it is widely

²³ Ahmed, W, *et al.* (2013). Black pepper and health claims: a comprehensive treatise, *Critical Reviews in Food Science and Nutrition*, 2013;53(9):875-86.

²⁴ Id.

²⁵ Mansoor, A. (2015). Potential of Black Pepper as a Functional Food for Treatment of Airway Disorders, *Journal of Functional Foods*, Volume 19, Part A, December 2015, pp. 126-140

²⁶ Koca, I. and Tasci, B. (2016). Garlic as a functional food. *Acta Hort.* 1143, 139-146

²⁷ Amarakoon, S. Jayasekara, D. (2017). A review on garlic (*Allium sativum* L.) as a functional food. *Journal of Pharmacognosy and Phytochemistry* 2017; 6(6): 1777-1780

²⁸ Zong, J. Martirosyan, D. (2018). Anticancer Effects of Garlic and Garlic Derived Bioactive Compounds and its Potential Status as Functional Food, *Bioactive Compounds in Health and Disease* 2018; 1(2): 16-35

²⁹ Butt, MS. Sultan, MT. (2011). Ginger and its Health Claims: Molecular Aspects, *Critical Reviews in Food Science and Nutrition*, Volume 51, Issue 5, pp. 383-393

³⁰ Combrinck, S. *et al.* (2015). Gingerols and Shogaols: Important Nutraceutical Principles from Ginger, *Phytochemistry*, 2015 Sep;117:554-568.

¹⁷ Id.

¹⁸ Chen, C. *et al.* (2020), Capsaicin – The Major Bioactive Ingredient of Chili Peppers: Bio-efficacy and Delivery Systems, *Food & Function*, 2020 Apr 30;11(4):2848-2860

¹⁹ Rivera, MG. Alejo, NO. (2020). Chili Pepper Carotenoids: Nutraceutical Properties and Mechanisms of Action; *Molecules*. 2020 Dec; 25(23): 5573.

²⁰ Goreja WG. *Black Seed: Nature's Miracle Remedy*. New York, NY: Amazing Herbs Press; 2003.

²¹ Sharma PC, Yelne MB, Dennis TJ. *Database on Medicinal Plants used in Ayurveda*. New Delhi: Central Council for Research in Ayurveda & Siddha, Department of ISM &H, Ministry of Health & Family Welfare, Government of India; 2005. pp. 420–40.

²² Oraby, HF *et al.* (2015). Health-promoting value and food applications of black cumin essential oil: an overview, *Journal of Food Science and Technology* 2015 Oct; 52(10): 6136–6142.

used in India and south Asia as a spice. A rich source of vitamins, minerals and antioxidants, clove offers a wide range of medicinal and functional benefits. Traditionally, clove essential oil is a major component of medicines used for treatment of burns and wounds, and as a pain reliever in dental care as well as treating tooth infections and toothache. However, modern scientific research suggests wider medicinal applications of clove. Pharmacologically, clove and its main constituents possess antimicrobial, antioxidant, anti-inflammatory, analgesic, anticancer, and anesthetic effects and they show insecticidal, mosquito repellent, aphrodisiac, and antipyretic activities^[31].

Conclusion

Herbs and spices play a major role in Indian culinary habits. The science relating to the usage of these herbs and spices has been traditionally protected in the culinary habits and need to be protected. However, there is a need for comprehensive scientific studies on the hidden benefits and side effects of these components of food.

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