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Spices: New Perspectives in Human Health and Wellness

Singh S*

Department of Chemistry, University of Lucknow, India

***Corresponding author:** Dr. Sunita Singh, Department of Chemistry, Navyug Kanya Mahavidyalaya, University of Lucknow, Lucknow, India, Email: oceans.singh@gmail.com

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Abstract

Spices, which have long been the basis of traditional medicine in many countries, have also been the subject of study, particularly by the chemical, pharmaceutical, and food industries, because of their potential use for improving health. Both in vitro and in vivo studies have demonstrated how these substances act as antioxidants, digestive stimulants, and hypolipidemics and show antibacterial, anti-inflammatory, antiviral, and anticarcinogenic activities. These beneficial physiological effects may also have possible preventative applications in a variety of pathologies. Given the long history of use of herbs and spices, they may be considered one of the first ever recorded functional foods. The phytochemicals present in spices hold promise for preventing or ameliorating various health disorders. Spice industry could exploit the fast growing nutraceutical sector with her high intrinsic quality spices. Proven therapeutic uses of spices in traditional systems of medicine and safety of spices for consumption without side effects are the basic strengths in this field. Numerous in vitro evaluation studies, in vivo studies in animal models and clinical validation studies conducted on health beneficial effects of spices are the stepping stones to exploit spices in the nutraceutical and health food industry.

Keywords: Antioxidants; Anticarcinogenic; Phytochemicals; Nutraceutical

Introduction

Spices are an important part of human nutrition and have a place in all the cultures of the world. The use of spices in culinary predates recorded history and is said to have been an integral part of local dishes in South Asia and the Middle East as far back as 2000 BCE [1]. The literature describes how they impart flavor and reduce the need for salt and fatty condiments, improve digestion, and provide the organism with extra antioxidants that prevent the appearance of physiological and metabolic alterations. Commonly the leaf part of the plant referred as herb whereas the other part of the plant often dried considered as spice. Spices can be buds, bark, roots, berries or aromatic seeds. Recently, multiple health beneficial attributes of spices were reported [2], based on extensive investigations undertaken. Due to their plant origin, spices are generally recognized as safe (GRAS). Safety evaluation studies conducted in animal models indicate that spices could be consumed at higher dietary levels without any adverse effects on growth, organ weight, and food efficiency ratio and blood constituents. In recent years, with the development of analytical techniques, knowledge about the spices, their chemistry and the pharmacological effects of their active constituents were investigated more thoroughly. Various in vitro and in vivo studies had well established the beneficial properties of spices which include its digestive stimulant action, hypolipidemic effect, antidiabetic influence, antilithogenic property, antioxidant potential, anti-inflammatory property, antimutagenic and anticarcinogenic potentials [3]. But due to promising health beneficial physiological effects, spices have immense potential in the nutraceutical industry. Nutraceuticals can be termed as a food or part of food or nutrient that provide health benefits along with prevention and treatment of diseases. Extensive research is being carried out in the nutraceutical sector and academia and industry have a long way to go. Yet, some spices are commonly used in the sector. For instance, ericifolin, a compound from allspice, works as an anti-tumour agent against prostate cancer. Turmeric is the most important spice in stem cell therapy and regenerative medicine.

The chemical composition of spices mainly comprises of proteins, fiber, sugars, essential oils, minerals, and pigments [4], besides bioactive components such as phenolic acids, flavonoids, sterols, and coumarins [5]. Other components present in spices are the essential oils (EOs), which contains terpenes, monoterpenes, and sesquiterpenes (as hydrocarbons, alcohols, ketones, etc., which may be acyclic, monocyclic, bicyclics, tricyclics), are responsible for many of their functional properties. The major bioactive compounds in turmeric are three curcuminoids (curcumin, demethoxycurcumin, and bisdemethoxycurcumin), whose biological activities include antioxidant, antiprotozoal, antimicrobial, antivenom, anti-HIV, antitumor, anti-inflammatory, anticancer, and anticarcinogenic [6]. Ginger (*Zingiber officinale* Rosc.), native of South-East Asia, belongs to the family of *Zingiberaceae*. Ginger and its extracts are found to be very effective in controlling cardiovascular and related diseases. Furthermore, it has anti-inflammatory, antimicrobial, anti-oxidative, and antitumorigenic properties. Most health benefits of ginger is related to the content of non-volatile pungent compounds such as gingerols, shogaols, paradols, and zingerone [7]. The principle component of anise volatile oil is Anethole, which is a phenolic compound and has a property of inhibiting cell survival and modulates the apoptosis in human breast cancer cells [8]. The carcinogens activities of benzo(a)pyrene [B(a)P] induced forestomach tumorigenesis in stomach and 3- methylcholanthrene (MCA) uterine cervix tumorigenesis in cervices were inhibited by different doses of cumin seed with mixed diet [9]. Cumin showed chemopreventive and anticarcinogenic properties by inhibiting lipid peroxidation which in turn modulates the carcinogen metabolism [10]. The oxidative stress initiated from free radicals leads to DNA damage along with lipid peroxidation which leads to ageing, atherosclerosis, cardiovascular diseases, cancer and inflammatory diseases. The seeds and extracts of fenugreek contains a large array of phytonutrients exhibiting antioxidant properties. This defense system was observed in isoproterenol-induced mycocardial infractions in rats. The reason behind this defense system is that fenugreek significantly decreases thiobarbituric acid reactive substances (TBARS) in rats and enhances the antioxidant activity [11].

Linanool, catechins, coumarins, terpenes, and polyphenolic components of coriander are responsible for its antioxidant properties [12]. Coriander also acts as digestive stimulant where it increases the secretion of bile juices which are very important for fat digestion and absorption [13]. Garlic is yet another spice widely investigated for its chemopreventive properties. The allium and organosulphur components present in garlic is helpful in reducing risk of several types of cancer by various mechanisms which includes inhibition of mutagenesis and suppressing the enzymes which are responsible for bioactivation of carcinogen molecules [14].

Nutraceuticals use spices for their phytonutrients, essential oils, antioxidants and vitamins which are known to have disease preventing and health promoting properties. The health enhancing qualities of spices are endless and so are their applications. Consumption patterns and lifestyles have also changed, thereby encouraging players to rev up their R&D engines and develop a range of nutraceutical products that leverage the manifold benefits of spices. So don't be surprised if your energy drink or instant mixes pack in potpourri of spices in the near future. Since most of the spices have multibeneficial health effects and their active components show synergistic action against various diseases, make them a potential candidate of exploration for the nutraceutical industry.

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