



Invited commentary

Some customary edible plants of incredible medicinal worth

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Even though, the contemporary medical technology made a tremendous progress, yet facing a huge challenge with respect to its easy availability to the needy people worldwide. In many developing and under-developed nations, the scarcity of effective modern medication is still a great lacuna in the healthcare system and policies. In these nations, the limited supply of advanced medicines is due to lack of transportation and high cost. Consequently, in such nations, a large proportion of the population has to depend on their traditional or complementary systems of medicine for general healthcare (Hegde, 2003).

In the current scenario, health problems have greatly risen due to unhealthy lifestyles and ignorance towards the environmental pollution. The ever increasing environmental toxicity has induced many stress related changes in humans and pathogens both. As a result, the immunity of human beings has decreased to an alarming level while the adaptation/resistance in pathogens, showed a reverse effect. Thus, complications have arisen further due to multidrug resistance in pathogens. The other major problem is related to the negative side effects of allopathic or synthetic chemical drugs on the vital organs of the diseased persons.

Thus, to provide effective and safe healthcare with better physiological compatibility, at an effective cost and fewer/no adverse effects, the research focus is again shifting towards the conventional systems of medicine and the area of phytomedicine is now an emerging as a thrust area of healthcare (Ansari *et al.*, 2019). The year 2013 with the launch of 'WHO Traditional Medicine Strategy 2014-2023' marks a significant development in this arena, globally. This strategically motivated planning emphasized on the promotion of earliest medicinal knowledge, which is effective, safe, almost free of charges and has wide acceptance.

India is believed to be one of the oldest centers for medicinal plant research with evidences indicating that in ancient India, Shusruta and Charaka were the well known medicine men with exceptional knowledge of surgical acts also. They have written 'Sushruta, Samhita' and 'Charaka Samhita', respectively, the manuscripts

related to alternative medicine and surgery. Both of these are considered as the systematic writings having a precious classic text on medicinal practices. Archeological excavations have gathered numerous evidences suggestive of the utilization of plants as medicine. However, since the beginning of 19th century, the mode of treatment was drifted towards the use of allopathic medicines in the India, even today, majority of the modern populace prefer allopathic medicines for treatment. But, the rural population of India even today depends on the ancient Indian medicinal practices like ayurveda, unnani and siddha.

Now, the urban population has also realized the side effects of allopathic medicines and started to prefer herbal drugs or phytomedicine or phytotherapy for maintenance of health as well as therapy of various ailments (Pandey *et al.*, 2013; Mafuva *et al.*, 2014). These practices are all based on the use of plants/plant parts, *viz.*, roots, bark, leaves, flowers, fruits, seeds and even the whole plants (Falodun, 2010).

As a result, the Indian government established a department of AYUSH to promote plant bases medication. The canopy of AYUSH covers herbs, plant parts or preparations, involving active ingredients of plant origin (AYUSH, 2012). In India, it is believed that approximately 25,000 plant-based formulations are consumed for their medicinal properties (Joy *et al.*, 2004). For over 28, chronic diseases, herbal formulae are utilized as they provide therapeutic relief (Sharma *et al.*, 2007).

The secondary metabolites in plants termed phytochemicals are largely responsible for their medicinal properties. These active ingredients classified on the basis of their chemical composition include alkaloids, saponins, terpenoids, flavonoids, sterols, volatile oils, phenols and biomolecules such as sugars and proteins. Various herbs and spices hold great potential for their medicinal properties. Few of them along with their novel medicinal importance have been discussed below:

1. *Aegle marmelos* (L.) Corrêa (Bael), a member of family Rutaceae is routinely used for relief from dysentery and diarrhoea, peptic ulcers, and as a laxative (Baliga *et al.*, 2011). The fruit juice treats gastric problems, if consumed empty stomach and the paste of the leaves helps during malaria in relieving high fever (Debbarma *et al.*, 2017). A decoction of fresh leaves can treat cough and can relieve eye problems (Jeyaprakash *et al.*, 2011). It is rich in (3,3-dimethylallyl) halfordinol (anti-diabetogenic

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and lipolytic activities), Limonene (anti-glycative properties), aegelin and lupeol (antihyperglycemic) (Gandhi *et al.*, 2012; Saravanan *et al.*, 2014)

2. *Coriandrum sativum* L. (Dhaniya), belonging to the family Apiaceae, has been used for its hepatoprotective, hypoglycemic and for its hypolipidemic activities with improved antioxidant potential. The spice has been used for its medicinal properties due to the presence of terpenes (Johanna, 2003) and caffeic, chlorogenic, ferulic and gallic acids (Bajpai *et al.*, 2005). Powdered fruit when administered to cholesterol-fed rats lead to decreased plasma LDL-cholesterol, total cholesterol levels, as well as total lipid concentrations, though it leads to increase in the HDL-cholesterol (Suliman *et al.*, 2008).

3. *Zingiber officinale* Rosc. (Ginger), belongs to the family Zingiberaceae, this rhizome has multiple health benefits. It is consumed for treatment of disorders such as diabetes and hypertension, relief from neuromuscular ailments as arthritis, sprain, muscular aches, cramps and infectious diseases like sore throats, and fever (Haniadka *et al.*, 2013). Its constituents provide specific properties as an antioxidant, antidiabetic, hypocholesterolemic and hypolipidemic potential (Rani *et al.*, 2012). The anti-inflammatory properties can be accounted for structurally related compounds as gingerols, shogaols and paradols (Grzanna *et al.*, (2005). Ghayur and Gilani (2005) and Ali *et al.* (2008) suggested that ginger can lower blood pressure as it stimulates muscarinic receptors and blocks calcium channels.

4. *Cuminum cyminum* L. (Jeera) belongs to the family Apiaceae. It has wide usage for treatment of dyspepsia, diarrhoea and jaundice and an aqueous extract showed potential to lower blood glucose in alloxan-induced diabetic rats, along with the reduction in plasma and tissue lipid concentrations (Lee, 2005). Saraswat *et al.* (2009) reported the prevention of non-enzymatic glycation of proteins, with the potential to alleviate diabetic complications. In diabetic animals, alterations in metabolic levels, such as lowering of blood urea and reduced excretions of urea and creatinine were noted by Villatgamuwa *et al.* (1998). Cumin is useful as a chemopreventive agent as a cumin seed-mixed diet significantly, inhibited the stomach tumor burden induced by benzo(a)pyrene [B(a)P] (Gagandeep *et al.*, 2003). The active ingredient include cuminaldehyde (Sowbhagya, 2013), alongwith cuminal, cuminic alcohol, safranal, *p*-cymene, β -pinene, γ -terpinene and volatile oils (Chatterjee and Prakash, 1997).

5. *Murraya koenigii* (L.) Spreng (Curry) belongs to to Family Rutaceae. The leaves (kadipatta) contain several carbazole alkaloids as mahanimbine, mahanine, mahanimbicine, euchrestine B and bismurrayafoline, have been traditionally used for its antioxidant properties. Ningappa and Srinivas (2008) isolated a 35 kDa antioxidant protein PII, having potential to inhibit lipoxygenase activity and lipid peroxidation on erythrocyte ghosts and ROS scavenging activity. In diabetic *ob/ob* mice, Xie (2006) depicted a decrease in blood glucose and cholesterol levels along with a reduction in body weight on leaf supplementation. Potential to lower blood glucose levels in streptozotocin-induced moderately and alloxan- induced mild diabetic rats, fed with curry

leaf powder showed a decrease of 8.2% and 21.4%, respectively, Yadav (2002). Khan *et al.* (1996) reported in high fat-fed young male albino rats, reduction in total serum LDL, VLDL and cholesterol concentrations and release of lipoproteins into the circulation. Also, an increase in HDL concentration, and lecithin cholesterol acyltransferase (LCAT) activity were observed on supplementation.

6. *Cinnamomum verum* J. Presl. (Dalchini), belongs to Lauraceae family. The pharmacological properties of this plant include antioxidant, antidiabetic, antibacterial, astringent antinociceptive, digestive, hypolipidemic and stimulant (Lopez *et al.*, 2005; Shan *et al.*, 2005). Wahab *et al.* (2009) reported that the major constituents comprising >95% of the cinnamon oil, are, namely; cinnamaldehyde (77.1%), (E)- β -caryophyllene (6.0%), α -terpineol (4.4%), and eugenol (3.0%). In spontaneously hypertensive rats, cinnamon prevents sucrose induced increase in blood pressure (Preuss, 2006) while in cholesterol-fed rats, hepatic HMGCoA reductase activity is inhibited along with a suppression in lipid peroxidation in the liver (Kannappan, 2005). Solomon and Blannin (2009) fed 5-20 mg/kg/day cinnamaldehyde to streptozotocin-induced diabetic rats and found a decrease in plasma glucose, glycosylated haemoglobin, cholesterol and triglyceride concentrations, with an increase observed in plasma insulin, HDL-cholesterol concentrations and hepatic glycogen. Use of cinnamon as hypolipidemic is well-known and in rats fed with cholesterol and cinnamate (0.1 g/100 g), inhibition of hepatic HMGCoA reductase activity and lipid peroxidation in the liver is noted.

7. *Curcuma longa* L. (Haldi) belongs to the family Zingiberaceae. This plant is well known for medicinal uses of its rhizomes as antiarthritic, anticancer, antibacterial, anti-hepatotoxic, antifungal, anti-inflammatory, antihistaminic, hypocholesterolemic. It is also known to improve Alzheimer's, asthma, blood impurities, cough, diabetes, obesity and worm manifestation (Chatterjee and Pakrashi, 1997). Curcumin along with essential oils such as *p*-cymene-8-ol in flower (26%) and phellandrene (33%) in leaf are the major phytochemicals (Leela *et al.*, 2002). Many properties of curcumin are attributed to its role in mediating the regulation through cytokines, growth factors, protein kinases, transcription factors and other enzymes. (Agarwal, 2007). The anti-inflammatory properties of haldi are attributed to its inhibitory effects on lipoxygenase (LOX) and cyclooxygenase-2 (COX-2), along with inducible nitric oxide synthase (iNOS). Further, improper up-regulation of above enzymes is coupled to the pathophysiology of cancer as well. As a result, the spice is now also consumed for its chemopreventive effects (Menon and Sudheer, 2007). Jagetia and Aggarwal (2007), highlighted the immunomodulatory activities of curcumin by modulating the activation of T cells, B cells, macrophages, neutrophils, natural killer cells, and dendritic cells; downregulating the expression of proinflammatory cytokines as chemokines, IL-1, IL-2, IL-6, IL-8, IL-12 and TNF, *via* transcription factor NF-kappaB inactivation., Weisberg *et al.* (2008) evaluated the effects of curcumin on obesity associated with diabetes, in high-fat fed obese and leptin-deficient *ob/ob* mice, and suggested that it possibly also alters fatty acid metabolism. Interestingly, curcumin has been found to exhibit therapeutic potential in both types of

diabetes, as in streptozotocin-induced diabetic rats. However, it did not show any hypoglycaemic activity (Srinivasan, 2005).

8. *Trigonella foenum-graecum* L. (Methi) belongs to the family Fabaceae. This herb has been used for curing abdominal pain, anorexia, body ache, diabetes and deficient lactation. These effects are mediated *via* its active chemical constituents, as saponins (β -sitosterol), flavonoids, alkaloids (trigonalin, vitexin, and tigogenine), galactomannan and volatile oils. It possesses anti-inflammatory, antitumour, antipyretic, analgesic, hypoglycaemic, hypolipidemic and pharmacological properties (Chatterjee and Prakash, 2005). Meghwal and Goswami (2012) suggested that seeds of methi contain 65% fibre which reduces energy intake, increasing satiety and controlling blood sugar. The fiber also has the potential to bind and remove toxins from the intestine, thus helping in prevention of cancer. Fenugreek contains phenolic and flavonoid compounds which help to enhance its antioxidant capacity (Balch *et al.*, 2003) which holds benefit for liver and pancreas function and these properties are enriched in germinating seeds due to better bioavailability. Kaviarasan *et al.* (2007) exhibited the potential of hydroxyl radicals scavenging and hydrogen peroxide-induced LPO inhibition in mitochondria as the extract is rich in antioxidants and cellular structures are protected from oxidative damage. The hypocholesterolaemic property is evident from the ability of an alcoholic extract to inhibit deoxycholate and taurocholate absorption in a dose-dependent manner when reductions ranging from 18 to 26% in plasma cholesterol levels were observed (Gupta, 2010)

9. *Allium sativum* L. (Garlic/Lahsun), a member of family Amaryllidaceae is globally used with a broad range of therapeutic responses like, lowering blood pressure, glucose levels, lipid levels and flatulence; reducing atherosclerosis risk and obesity; and is well known as antimicrobial, anticancer and hepatoprotective agent. These effects of garlic have been credited to the presence of sulphur compounds of which Allicin (diallyl thiosulphonate) is the major bioactive component and allyl methyl thiosulphonate, 1-propenyl allyl thiosulphonate and γ -L-glutamyl-S-allyl-L-cysteine being other constituents (Banerjee *et al.*, 2003). Studies have shown that garlic has the ability to inhibit angiotensin II through inhibition of angiotensin converting enzyme thus promoting vasodilation (Benavides *et al.*, 2007). Animal studies, depict organ-protective effects on the heart, liver and kidneys helping in control of blood pressure in hypertensive patients as it inhibits thickening of lipid-filled lesions on plaques produced post-injury to right carotid artery in cholesterol-fed rabbits. Area of thoracic aorta covered by fatty streaks is also reduced by the spice (Reinhart *et al.*, 2008; Ried *et al.*, 2009).

The above mentioned herbs/spices have been used in the household regularly so their consumption as medicines forms a psychological barrier. However, the same if dissolved will help in providing health benefits with few adverse effects at a low cost. With respect to herbal products, another area gaining popularity is nutritional supplements and functional foods. They provide nutrients which go amiss in the diet or its adequate quantity is not consumed through the diet. They are rich in antioxidants, minerals, macronutrients, vitamins, *etc.*, all of which promote good health. This concept was

prevalent since ancient times in India as formulations like chyawanprash, musli pak, and ashwagandhadi lehyam were consumed for maintenance of good health. The different phytochemicals in herbal medicines work singly, in additive fashion or even synergistically, insight to which is essential for developing novel products. This holistic approach to treatment is a key factor for the success of Indian traditional medicine, especially Ayurveda, around the world (Sheth, 2005).

A bio-enhancer from pipali 'Piperine', and so also 'Vijayasar' (aqueous decoction of *Ptero-carpus marsupium* Roxb.) have been successfully evaluated in clinical studies as hypoglycemic and antidiabetic drugs. A US patent has been approved for an herbal anti-psoriatic medicine containing *Argemone mexicana* (L.). The Central Drug Research Institute (CDRI) marketed a drug from *Commiphora wightii* (gugulipid fraction) for relief from hyperlipidemia and atherosclerosis while Regional Research Laboratories (Jammu) has commercialized *Boswellia serrata* Roxb., gum resin as a non-steroidal anti-inflammatory drug, exhibiting hypolipidemic effect (Gurib-Fakim, 2011; Sen and Chakraborty, 2015). In Asian and European countries, Brahmi (*Bacopa monnieri* L.) product developed by the CSIR and CDRI is marketed.

Major challenges faced in acceptance of herbal products are lack of standard protocols for drug standardization, quality control, and assurance (Rana and Rana, 2014). The heavy metal contamination beyond permissible limit and adulteration and substitution of undeclared components, added for better efficacy, is a concern for acceptance of herbal products in a study of 260 patented medicines. About 20% drugs available online have been found to be contaminated with heavy metals as lead, mercury, and arsenic, which is another deterrent to online purchase of herbal formulations (Moshi, 2005). GMP application is vital for the quality of the herbal medicines. Further, in our country, most non-conventional medicinal products are made available over the counter (OTC) and strict quality parameters are not adhered to. This arises largely due to the unavailability of conventional quality control and assurance parameters being unavailable due to the complex composition of herbal medicines.

The future of herbal products is bright, but legislations for marketing of herbal products have to be redefined. The need of the hour is to develop standard procedures with recommendations for even cultivation as well as postharvest processing. The research for herbal products should culminate at patenting post which stringent procedures to be monitored during manufacture and marketing strategy. The involvement of local medicine men is an important aspect for a successful program. An ideal solution could be creation of government-certified raw material supply centers across the country, so that verified raw materials are made available. Use of taxonomic, chemical, genomic, and proteomic markers, to ascertain the identity of components can help resolve issues of addition and substitution. With advancement in recombinant DNA technology (RDT) fingerprinting of raw material, if conducted will increase the acceptability of the drugs across the world. (Bandaranayake, 2003; Fan *et al.*, 2006; Saxena *et al.*, 2007; Li, 2008).

In conclusion, it is evident that the demand for novel and well known herbal products will be on the rise due to their safety claims.

For best availability and promotion of these herbal medicines the role of government policy makers becomes crucial and organization like AAYUSH have to settle all the concerns related to the development and marketing of these products in a well regulated mode. Capacity building in the area of ethnobotany will be a crucial step in this direction because the tribes across the globe are reservoirs of precious information regarding medicinal uses of various plants. Further, submissions for product research and marketing should be evidence-based to increase acceptance to spread the phytomedicine to global markets. Since India is among the mega diversity centers, hence considered as a treasure of phytomedicine with never ending scope. Finally, a coordinated and serious effort of local people, ethnobotanist, herbalists and government officials can do wonders in this area with huge opportunity of employment.

In the proper dissipations of emerging new scientific knowledge, scientific journals play key roles by publishing properly scrutinized and reviewed good quality research articles. It is heartening to note that, currently, important journals are indexed and the journal contents are rapidly made available online to the world. In today's competitive world, the success of a journal depends on, to a large extent, getting good quality research findings including scientific concepts in the form of well-presented manuscripts as well as availing the services of efficient, experienced and unbiased reviewers. In the emerging scenario of the 21st century, phytomedicine is gaining wider acceptance and importance, because it is truly a multidisciplinary areas, encompassing several disciplines. In view of the ever increasing amount of awesome research work to be carried out in the development of phytomedicines and conventional medicines from plants, a matching increase in the number of good quality, reputed journals is a requirement (Pushpangadan, 2013; Subramoniam, 2014). In this context, *Annals of Phytomedicine: An International Journal*, with a commitment to excellence in publishing cutting edge research in all areas of phytomedicine is a welcome arrival. It is gratifying to see that “*Annals of Phytomedicine*” is catering to the needs of scientists from different closely related disciplines by promoting the publications on plant medicines and specially by inviting the commentaries of stake holders. It is a challenging and a difficult job to run such a journal successfully. I am very happy and informing you all, working in the field of phytomedicine that “**Annals of Phytomedicine: An International Journal**” is on its way towards accomplishing its mission and bringing it to the greater heights.

Conflict of interest

The author declared that there is no conflicts of interest in the course of conducting the research. The author has final decision regarding the manuscript and decision to submit the findings for publication.

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President of Global Federation of Medicinal and Aromatic Plants (GOFMAP)

Biography

Professor Nazim Sekeroglu was born in 1972. He graduated from Field Crops Department, Agricultural Faculty, YuzuncuYil University in Van-Turkey. He got his PhD degree on agronomy and quality analysis of Medicinal and Aromatic Plants at Cukurova University, Adana-Turkey. Now, he has a 30 years' background of teaching and research activities in ethnobotany, wild edible plants, functional foods; cultivation, processing and analysis of medicinal and aromatic plants under the Fields Crops Department, at the Kilis 7 Aralık University, Kilis-Turkey. He has many collaborations and research projects with agricultural and pharmacy faculties around the world. He has more than one hundred full text scientific papers at respected scientific journals and more than three hundred presentations as invited and plenary speaker, at scientific meetings on the worldwide. He was awarded by “**Late Smt. Kamal Ben Vavia Memorial Award-2015**” at “Pharmacy Institution of Madhya Pradesh, DAVV Auditorium, Takshash Campus, in Indore, India. Professor Sekeroglu is founder of some international associations related to Medicinal and Aromatic Plants like AMAPMED (Association of Medicinal and Aromatic Plants of Mediterranean), www.amapmed.org and GOFMAP (Global Federation of Medicinal and Aromatic Plants), www.gofmap.org. He is also a core committee member of AMAPSEEC (Association for Medicinal and Aromatic Plants of Southeast European Countries). As a founder and president

of MESMAP (International Mediterranean Symposium on Medicinal and Aromatic Plants), www.mesmap.com scientific meetings, he has connected more than one thousands scientists studying on Medicinal and Aromatic Plants from all disciplines under the MESMAP umbrella throughout the world up to now. Presented scientific works at MESMAP symposiums have been published at special issues of respected journals, (e.g., Industrial Crops and Products by Elsevier; Annals of Phytomedicine: An International Journal by Ukaaz Publications, Hyderabad, India and Molecules by MDPI) with high impact factors. The sixth series of the well-known meeting, MESMAP-6 will be organized during April 16-19, 2020 in Ephesus, Izmir-Turkey. Professor Sekeroglu is the science director of the International Cosmetic Congress organized in Turkey, as well. He is editorial and advisory board member of many international scientific journals, symposiums and congress. He is also founder and Chief-editor of CUPMAP (Current Perspectives on Medicinal and Aromatic Plants), <https://dergipark.org.tr/en/pub/cupmap>, an open access, peer-reviewed and refereed international journal published by MESMAP scientific group. He is member of scientific councils at the Turkish Ministries of Agriculture, Forestry and Industry. Besides his academic and scientific activities, he has also many administrative duties at university like manager, dean, vice rector and international relations coordinator.