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An Exploration of Significant Curative Spices: A Review

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Abstract**: Spices are important food supplements, which have been used as flavouring agents and preservatives for thousands of years in tropical Africa, Asia and other parts of the world. They are well known for their medicinal properties, and their use in traditional systems of medicine has been on record for a long time. Current biomedical efforts are focused on their scientific merits, to provide science based evidence for the traditional uses and to develop either functional foods or nutraceuticals. Although, epidemiological and clinical studies have indicated that spices are important source as antioxidant, bioavailability enhancement nature, antimicrobial activity, hypolipidemic property, antidiabetic influence, anti-inflammatory ability, anticarcinogenic potential, neuroprotective effect, antiallergic, antibacterial, antifungal, antispasmodic, hepato-protective, hypotensive, antiaging, osteoporosis, DNA damage, heart diseases, induce apoptosis, diuretic, central nervous system stimulant, analgesic, immuno-modulator and carminative. The review included black pepper, turmeric, cinnamon, garlic, oregano, thyme, ginger, cumin, nutmeg, clove, coriander, fennel, rosemary, cardamom, chili pepper, fenugreek, and kokum. The spices were characterized by the presence of mineral elements such as calcium, iron, potassium, phosphorus, sodium, magnesium, copper and zinc which are very important to human nutrition. Phytochemical screening indicated that these spices are also rich in phytonutrients including alkaloids, saponins, terpenoids phytoestrogens, carotenoids, limonoids, phytosterols, glucosinolates, polyphenols, flavonoids, isoflavonoids, anthocyanidins, tannins, proteins, glycosides, carbohydrates, quinones, coumerin, and emodins in different quantities. The present review findings indicate that the spices are good sources of nutrients, mineral elements and phytochemicals which could be exploited as great potentials for drugs and nutritional supplements.
Keywords: Traditional,Spices, Phytochemicals, Drug, Nutraceuticals

I. INTRODUCTION

Traditionally, herbs and spices were used as scented, flavour, delicious, aromatic and medicinal plants. Everyone can smell, eat, bath in, and heal with them. The US Food and Drug Administration outline a spice as an “aromatic substance whose important function in food is “seasoning instead of nutrition” and from that “no portion of any volatile oil or alternative flavouring principle has been removed. However, herbs are defined as foliate as well as green part in non-woody plants of temperate climate zone[1].When fresh, herbs are more scented, however spices are mostly stronger as dried powders. In many cases, each herb and spice may come from a similar plant. Like, the seeds from the dill plant are spices, whereas the stalk of the plant is herb this can be because of herbs have always been recognized because of the green, leafy product[2].The sacred Vedas, back between 3500 B.C and 800 B.C gave several references of medicinal plants. One of the distant works in traditional herbal medicine is “Virikshayurveda”, even before Christian age. “Rig Veda”, that is one of the oldest existing literatures written around 2000 B.C described the uses of various plants in religiously also as medicinally[3, 4]. The medicinal value of plants lies in its chemical substances that produce a precise physiological action on the human body. The development in criteria for proofing that a drug really does what it's appealed to do, and the identification of the active compound from plant by analysis plays a vital role towards the understanding of a plant derived drugs. According to world health organization (WHO), over 80 % of the world’s population depends on traditional medicines for their tending demand[5, 6].Another study of curcumin, which given to cancer patients at 3600 mg/day for 4 months or 800 mg/day for 3 months, only minor adverse effects are seen. For resveratrol, a single oral dose at 5g in ten volunteers only causes minor adverse effects. This shown that herbs are comparatively safe to use, their combined use with orthodox drugs should be done with caution. Also, concomitant use of typical and herbal medicines is reported which leads to clinically relevant herb–drug interactions. The two may act either pharmacokinetically or pharmacodynamically as adverse herbal-drug interactions. It has been proposed that human ancestors evolved a generalized defence mechanism against low levels of phytochemicals to enable their consumption of many different plant species containing variable levels of natural pesticides without resulting health problem[5].

II. EVALUATION

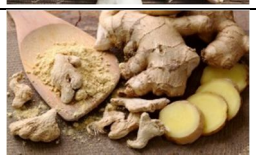
Phytochemicals from plants are bioactive non-nutritive chemicals contains defensive and disease preventive properties. They're non-essential nutrients, that aren't required by the human body for nourishment. These chemicals are utilized by plants to guard themselves, that formed during the plant's normal metabolic. This can protect humans against various diseases. Over 4,000 phytochemicals are classified by protecting function, physical characteristics and chemical characteristics and around 150 phytochemicals were studied very well till now[7].Fruits, vegetables, legumes, whole grains, nuts, seeds, fungi, herbs and spices. Broccoli, cabbage, carrots, onions, garlic, whole wheat bread, tomatoes, grapes, cherries, strawberries, raspberries, beans, legumes, and soy foods are common sources of various phytochemicals. Phytochemicals accumulate in different parts of the plants, like within the roots, stems, leaves, flowers, fruits or seeds. Several phytochemicals, significantly the pigment molecules, are typically concentrated within the outer layers of the various plant tissues. Levels vary from plant to plant relying upon the range, processing, cooking and growing conditions. Phytochemicals are also out there in supplementary form show ever, proof is lacking that they supply an equivalent health edges as dietary phytochemical[8].

A. Spices

Spices could have other uses like medicinal, religious ceremony, cosmetics or perfumes production and as vegetables. Homeopathic drugs also have been using spices collectively of the chief ingredients in most of their preparations. The modern-day medication system also uses natural products from a variety of spices as medicine and pharmaceuticals[9].The phytochemicals, which have been discovered to be present in small quantities considered as secondary metabolites include among others, alkaloids, steroids, tannins, phytoestrogens, terpenoids, flavonoids, and phenolic compounds. Additionally, as preservative, essential oils extracted from spices are typically recognized as containing active antimicrobial compounds that may inhibit the expansion of both gram positive and gram-negative bacteria, as well as prevent mold growth in addition to adding flavour and aroma to baked product. The antibacterial activities of spices have perpetually been the centre of attraction because of the assorted ailments caused by pathogenic bacteria and an everyday need to counter such harmful bacteria throughout living. This has made the necessity of spices in daily food. Foods containing these phytochemicals not solely will provide our diet with certain antioxidant vitamins like vitamin C, vitamin E and provitamin A, however can also offer a complex mixture of different natural substances with antioxidant capacity[5, 10, 11].(black pepper), gingerone (ginger) and cumin aldehyde (cumin), etc. are reported to inhibit lipid peroxidation[12].Common spices, like sweet basil, clove, black pepper, turmeric, chili pepper, and ginger are typically a part of daily household meals and conjointly used as traditional medicine in many countries. For example, primarily, "Pepper soup" is known for its sensory, aromatic, attractive, pungency and spicy flavour ensuing from the use of bastered melegueta, clove, alligator pepper, ginger, black pepper, garlic, ethiopian pepper, chili peppers and other different spices. Food industries have applied antioxidants like Butylated Hydroxytoluene (BHT) and Butylated Hydroxyanisole (BHA) to stop spoilage. However, their safety is uncertain and consumers are progressively demanding natural compounds[13].Food oxidation is considered a serious cause of food deterioration and spoilage, causing rancidity in food. The resultant impact is detected within the reduced nutritional quality, colour, flavour, texture and safety of foods. Turmeric in Indian cuisine; basil, garlic, and oregano in Italian and Greek cuisines; and lemon grass, ginger, cilantro, and chili peppers in Thai food represent different cultural diversity within the use of spices[14].Other herbal medicines that are very rich in antioxidants include Triphala, an Indian Ayurvedic herbal formulation, that was shown to possess anti-inflammatory activity, antibacterial and wound-healing properties, and cancer chemo preventive potential. Arjuna, another Ayurvedic formula, has been shown to possess health advantages[15-17].

Table 1 List of selected spices

SPICES	
Black pepper (Piper nigrum)	
Turmeric (Curcuma longa)	

Cinnamon (Cinnamomum verum)	
Garlic (Allium sativum)	
Ginger (Zingiber officinale)	
Clove (Syzygium aromaticum)	
Coriander (Coriandrum sativum)	
Cardamon (Elettaria cardamomum)	
Chili pepper (Capsicum annuum)	
Fenugreek (Trigonella foenum-graecum)	

Spices, like clove (toothache, fever, pain), cinnamon (nervous issues, stomach/intestine infections), turmeric (antimicrobial, wound healing), garlic (antiseptic, diuretic), ginger (digestive aid, cold), black pepper (cough and cold) etc. are reported to possess very good medicinal properties. Although, these spices offer a large spectrum of medicinally important activities, a comparative account of assorted species is often not available. Such studies are required in reference to optimize their use in food and also as drugs [9].

1) *Black pepper*: *Piper nigrum*, generally called climbing black pepper, which belongs to the family Piperaceae. It's a vital medicinal plant and usually used as spices. *Piper nigrum*is a monocious or decorous climbing vine native to Southern India and Srilanka and is extensively cultivated in tropical regions. They have many uses like they assist in pain relief, rheumatism, chills, flu, colds, muscular aches and fever. Outwardly, it's used for its rubefacient and as a local application for relaxed sore, throat and some skin disorder. It's antimicrobial, antimutagenic, antioxidant and radical scavenging property and inhalation of black pepper oil increase the spontaneous swallowing movement[7, 18].

   It contains phytonutrients such as caffeic acid, camphene, carvacrol, coumaric acid, eugenol, gamma terpinene, hyperoside, isoquercitrin, kaempferol, linalyl acetate, methyl eugenol, myrcene, myristicin, quercetin, quercitrin, rhamnetin, rutin, quinone, α-pinene, bisabolone, borneol, carvonecineol, caryophyllene, caryophyllene oxide, humulene, limonene, linalool, phellandrene, pinenes, piperine, sabinene, terpinene. Piperine is an alkaloid found naturally in Piper nigrum and Piper longum. Piperine is the Trans stereoisomer of 1-piperoylpiperidine. It's additionally have (E, E)-1- piperoylpiperidine and (E, E)-1- [5-(1,

3benzodioxol-5-yl)-1-oxo-2, 4-pentdienyl] piperidine. Piperine is that the alkaloid responsible for the pungency of black pepper and long pepper, in conjunction with chavicine. It's additionally been used in some forms of traditional medicine and as an insecticide[19]. Study reported that piperine is widely used in various herbal cough syrups for its potent antitussive and bronchodilator properties. It's used in anti-inflammatory, antimalarial, antileukemia treatment. Many studies have shown that it's helpful in increasing the absorption of certain vitamins, selenium, β-cartene, also increase the body's natural thermogenic activity[11]. It also inhibits a number of pro-inflammatory cytokines that are produced by tumor cells. It interferes with the signalling mechanisms between cancer cells, thereby reducing the probabilities of tumor progression. Collectively, these properties build black pepper as one of the most vital spices for preventing cancer. Black Pepper contains many powerful antioxidants and is therefore one among the foremost vital spices for preventing and curtailing aerophilous stress. Additionally, to their direct antioxidant properties, many of these compounds work indirectly by enhancing the action of alternative antioxidants. This makes it a valuable spice in minimising the damage caused by a diet rich in saturated fats, which is one of the main causes of oxidative stress[16].The high levels of cholesterol and triglycerides related to oxidative stress inhibit the efficaciousness of vital antioxidants like glutathione, superoxide dismutase, catalase, glutathione peroxidase, vitamin C and vitamin E. It also increases the bioavailability of active compounds contained in green tea, turmeric and a range of different spices by up to several hundred percent, depending on the molecule involved[20].

2) *Turmeric*: Turmeric is a widespread spice derived from the root of Curcuma longa Linn, a member of the Ginger (Zingiberaceae) family. Curcuma longa Linn or turmeric is a tropical plant native to South and Southeast tropical Asia. The rhizomes, on maturity, are steeped in boiling water, sun dried and polished to get the turmeric sticks. The powder form is used in numerous dishes. Turmeric contains essential oils, fatty oils and 2-5% curcuminoids. Certain varieties, contain up to 9-11% curcuminoids. It has all proximate principles like carbohydrates, proteins and fats and other nutrients in small quantities. It is rich in omega-3 fatty acids[19].Turmeric cultivation in India occupies 60% of the total area intended for spices and condiments. It is not only an ancient but also a highly cultivated Asian spice and used in countries like India, China, Malaysia, Pakistan, Bangladesh, Indonesia, Taiwan, Haiti, Jamaica and El-Salvador. Traditionally, turmeric is used in numerous ways for different diseases, due to its kaleidoscopic properties, for example as a general tonic, stimulant, cosmetic and for the treatment of coughs, colds, soar throats, asthma and dyspepsia including peptic ulcers. It is also used as a deworming agent and as a paste for some viral diseases such as chicken pox, small pox and measles. It is abundantly used in arthritis and for wound healing. These traditional uses reflect its pleiotropic effects[20].

It contains phytonutrients such as caffeic acid, camphene, coumaric acid, curcumin, eugenol, gamma terpinene, protocatechuic acid, salicylates, tetrahydrocurcumin, turmerin, turmeronol, vanillic acid, curcumol, curdione, turmerone, zingiberene. Curcuminoids are polyphenolic compounds with a β-diketone moiety. The three types of curcuminoids, namely Curcumin I, II and III, differ with regard to their hydroxyl and methyl groups[21, 22].

It has been used in Ayurveda and other traditional medical systems and is taken into account as stalwart within the treatment of diseases. The anticancer potential of curcumin stems from its ability to suppress proliferation of a wide type of tumor cells, to down-regulate transcription factors, to down-regulate the expression of cyclooxygenase-2, Lysyl Oxidase (LOX), inducible nitric oxide synthase, Matrix metallopeptidase (MMP)-9, urokinase-type plasminogen activator (uPA), Tumor necrosis factor (TNF), chemokines, cell surface adhesion molecules, and cyclin D1, to down-regulate growth factor receptors, and to inhibit the activity of cJun proto-Oncogene N-terminal kinase, protein tyrosine kinases, and protein threonine kinases[23].

Curcumin is a key active constituent of Curcuma longa. This yellow natural phenol has been used traditionally in Oriental medicine. Curcumin's oral administration exhibited low levels in tissues and plasma, rapid metabolism, and extensive rapid excretion. Insolubility in water and nonabsorption are potential factors that limit the bioavailability of curcumin, thus multiple approaches to extend curcumin bioavailability are in progress with the utilization of absorption factors, a structural analogue, liposomes, or nanomaterials[24].They also showed that this phytochemical will restore biochemical and behavioural changes induced by the chronic stress. Additionally, study shown that the antidepressant advantage of curcumin involves 5-hydroxytryptamine (HT) receptors, specifically 5-HT1A/1B and 5-HT2C subtypes. Also, curcumin can reverse 5-HT1A mRNA alteration in Rat'shippocampus. Further, the antidepressant action of curcumin could also be associated with the rise of hippocampal brain derived neurotrophic factor closely implicated within the pathophysiology of depression. It is a powerful chelating agent for both metals, binding to the metal ions and permitting them to be safely excreted within the urine[25].

Recently, found that nuclear factor erythroid 2–related factor (Nrf2) expression level in heat-stressed quail was linearly raised in response to increasing supplemental curcumin level, while theHeme oxygenase(HO)-1 level was upregulated. The positive antioxidant effects on the transcription level could be further demonstrated within the decreased Malondialdehyde (MDA) level.

The HO-1 gene is redox regulated and the curcumin induced HO-1 over expression was correlated with the activation of transcription factors Nrf2[26].

Much of the analysis and interest in curcumin has centred on breast cancer, human immunodeficiency virus (HIV) infection and arthritis however it's also been found to have protective effects against cancers of the bladder, stomach, uterus and cervix. When measured against other phytonutrients that protect against cancer, curcumin exhibits a minimum of ten times greater chemo protective efficiency than its nearest rival. Most breast cancers are hormone dependent, requiring oestrogen as a growth stimulant. Its antioestrogenic effects by blocking the oestrogen dependent receptors on tumor cells, thereby interrupting the stimulatory effects of oestrogen and slowing tumor growth. Some studies have shown that curcumin is also as effective as an oestrogen antagonist, with none of the attendant side effects of this drug. It is a valuable preventive agent for Alzheimer's, Parkinson's syndrome diseases devastating and increasingly common diseases. Curcumin is recommended with black pepper and long pepper[1].

3) *Cinnamon*: Cinnamon or Cinnamomum verum is a spice obtained from the inner bark of some trees from the genus Cinnamomum species. It contains phytonutrients such as caffeic acid, camphene, coumaric acid, epicatechin, gamma-terpinene, isoeugenol, linalyl-acetate, mannitol, methyl-eugenol, myrcene, phenol, proanthocyanidins, vanillin, cinnamaldehyde, cinnamic acid esters, coumarin, eugenol, hydroxychalcone, safrole, salicylates[16, 18].Cinnamomum zeylanicum, a tree is indigenous to Sri lanka and currently cultivated in many different tropical countries too. It's usually confused with a product derived from the tree Cinnamomum aromaticum that includes a similar flavour and medicinal properties to “true” Cinnamon. Both of these spices are widely accessible in most countries. It was used by the traditional Egyptians alongside different spices in their embalming and mummification of the dead, its antibacterial and antioxidant properties assisting in the preservation of the bodies[19].Additionally, it has been used as a traditional medicine to treat a range of ailments as well as colds and digestive issues, as a fragrance, and for flavouring wines. It's used primarily as flavouring for confectionery and as a modern spice in tea and coffee. Intense medical interest has, however, been stimulated by the recent discovery of its potent antidiabetic effects. This property has been attributed to hydroxychalcone and different polyphenols found in this spice that even have antioxidant and lipid lowering properties. The study of infection like Urinary infections, which caused by common uropathogens like enteric gram negative bacteria like E.coli, Proteus mirabilis, klebsiella species, Enterococcus species. Cinnamon oil is effective against shigella species and pseudomonas species isolated from urinary tract infection (UTI) patients[27].Also, it's a strong inducer of insulin sensitivity making it a good treatment for both type II diabetes and metabolic syndrome. Further, as a strong impact on abnormally high blood lipid levels[20].

4) *Garlic*: It is a part of the lily (Amaryllidaceae) family and is closely associated with shallots. The bulb is formed of a series of bulblets called cloves. The bulb includes a papery exterior skin that varies in colour from white to purple. There are many varieties with the Allium sativum or soft neck being the most common variety. It is used for digestive stimulants, diuretic, antispasmodic and cancer. Its utilization was found to kill pathogenic bacteria, rotavirus infection also as protozoa. Additionally, found to move against Helicobacter pylori[28]. It contains varied phytonutrients like allicin, alliin, allyl-mercaptan, apigenin, caffeic acid, chlorogenic acid, coumaric acid, diallyl pentasulfide, diallyl-trisulfide, ferulic acid, glutathione, hydroxy benzoic acid, kaempferol, lignin, myricetin, oleanolic acid, phytic acid, quercetin, rutin, s-allyl-l-cysteine, s-allylcysteine-sulfoxide, salicylic acid, sinapic acid, taurine, vanillic acid, ajoene, arginine, cycloalliin, diallyl disulfide, diallyl sulphide, tryptophan. The presence of allicin in garlic helps within the disruption of cell membrane biosynthesis. It also inhibits DNA polymerases and inhibits RNA synthesis, and as such disrupts the full enzyme system that's responsible for cell replication. Even destroys the SH groups in proteins[23].The regular consumption of garlic encompasses a protective result against variety of different malignancies, together with cancers of the colon, breast, bladder, liver, prostate, lung, and leukaemia. Whereas, not all the chemo protective mechanisms through which it works are understood. It’s noted to suppress cox-2 activity that is related to inflammation and malignancy. Its antitumorigenic properties are, in part, due to its protective result against some harmful ingested toxins. The allyl sulphides and other compounds found in garlic plants also protect against a variety of other carcinogenic substances. Used as an alternate treatment for the conditions underlying cardiovascular disease. By increasing the degree of nitric oxide within the blood, it will increase vasodilatation and thereby lowers blood pressure. Interestingly, reduced nitric oxide levels are also related to erectile dysfunction, and medicines like viagra work by increasing nitric oxide levels[19].

It has blood glucose-lowering properties and has the power to reduce the raised blood lipid levels that are usually found in diabetic patients. Promising laboratory studies show that this spice can reduce amyloid deposition by up to 30 %, along with turmeric. It's a very important spice to use for the treatment of Alzheimer. Garlic has many properties that make it a very

important substance within the management of obesity and could be a valuable part of any weight loss strategy. It contains ajoene that is an inhibitor of lipase, a pancreatic enzyme that breaks down dietary fat.

Many of its compounds stimulate the proliferation of many white blood cell lines and induce the infiltration of tumor by white blood cells like natural killer cells and macrophages. They conjointly stimulate the discharge of tumor necrosis factor, interferon and other cytokines that are crucial to the prevention and spread of cancer. Also, as most potent antimicrobial spices[20].

5) *Ginger*: Ginger or Zingiber officinale is a perennial herb that grows from underground rhizomes of Zingiberaceae family. The rhizome has thick lobes coloured from tan to white. Fresh ginger contains "gingerols" and when exposed to air and heat changes to "shogaols". The main content of ginger includes protein, lipids, carbohydrates, minerals and vitamins and trace nutrients. Additionally, it has capsaicin, curcumin and limonene also as proteolytic enzymes[23].

It is currently cultivated across the world to be used in an enormous type of foods, drinks and traditional medicines. It's added to sweet and savoury dishes, condiments, confectioneries, sweets, and is a component of the many traditional cuisines, as well as in Chinese, Indian, Japanese and Thai dishes. It's also been utilized in perfumes, cosmetics and is a valued medicinal plant. It's utilized in folk medicine to treat colds and influenza anda good antiemetic utilized in the treatment of motion sickness, the nausea and vomiting related to pregnancy. It contains phytonutrients such as caffeic acid, camphene, capsaicin, chlorogenic acid, coumaric acid, curcumin, delphinidin, eugenol, ferulic acid, gingerdiol, gingerol, isoeugenol, kaempferol, melatonin, myrcene, myricetin, quercetin, shogaol, vanillic acid, vanillin, zingerone, geranial, neral, paradol, phellandrene, zerumbone, zinziberene[20]. Many of the phytonutrients found in ginger have incontestable strong anticancer activities in both laboratory and clinical studies. Melatonin is an antioxidant produced by the body that's also found in some plants has ability to access most parts of the body, together with brain and nervous tissue, and protects DNA against carcinogenic free radical damage. It's been shown to lower hazardously high cholesterol and triglyceride levels, whereas raising the amount of useful high-density lipoproteins. This lipid modulating effects are partially because of the inhibition of fat absorption from the intestines. Additionally, its cardio protective effects are increased by its ability to cut back the platelet stickiness to reduce the risk of heart attacks and thrombotic strokes. It's a valuable prophylactic spice against type II diabetes[19]. Curcumin and gingerol, are shown to inhibit and even reverse the deposition within the brain of the amyloid plaques that are related to Alzheimer's disease. Zingerone, another of its antioxidants, neutralizes the powerful oxidant, peroxynitrite, that has also been involved as an aggravating factor in Alzheimer's and Parkinson's disease. The compounds gingerol and shogaol increase the rate and so facilitate to "burn off" excessive fat. It's also shown to be a valuable treatment for gastrointestinal conditions, again as lowering the chance of heart attack or stroke[8].Ginger has traditionally been used as a treatment for abdomen ailments, and been shown to kill pathogenic *Helicobacter pylori* species. It inhibits neoplastic transformation in mouse epidermal cells, which blocks Vascular endothelial growth factor (VEGF)induced capillarylike tube formation within the mouse cornea, and suppresses respiratory organ metastasis of B16F10-melanoma. Likewise, found to suppress phorbol 12-myristate 13-acetate (PMA)-induced IκBα degradation and translocation of Transcription factor p65 to nuclear in mouse skin by interference of upstream kinase p38 mitogen-activated protein kinase (MAPK)[22].

6) *Clove*: Cloves or Syzygium aromaticum are the aromatic flower buds of a tree from family Myrtaceae. Cloves are the fruit of a tree indigenous to Indonesia. It is used in Indian Ayurvedic medicine, Chinese medicine, as well as in Western herbalism. Cloves are used as a carminative, to increase hydrochloric acid within the abdomen and to enhance peristalsis. Cloves are also natural anithelmintic and applied to a decayed tooth cavity. It additionally relieves toothache[16, 18].It contains phytonutrients such as β-caryophyllene, ellagic acid, eugenol, eugenol acetate, hyperoside, isoeugenol, isoquercitrin, kaempferol, methyl eugenol, myricetin, oleanolic acid, pedunculagin, procyanidin, quercetin, rhamnetin, eugenin, eugenyl acetate, syringic acid. Sesquiterpenes and phenolic compounds are major constituents in essential oil showed potent anticarcinogenic activity. Further, reported to induce the detoxifying enzyme, glutathione-S-transferase, in mouse liver and small bowel cancerous cells. Other constituents like triterpenes in cloves, act as chemo preventive agents against breast cancer as they can reinforce apoptosis and stop cellular proliferation[1]. Eugenol and acetate inhibit platelet aggregation and therefore protect against heart attacks and thrombotic strokes. It is reported that bayleaf, cinnamon, cloves, and turmeric all will treble insulin activity[13].

7) *Coriander*: Coriander also called as Cilantro or Chinese Parsley from Umbellifers family. Coriander or Coriandrum sativum is indigenous to Southern Europe; however, it's widely used in Asiatic and South American culinary art also as that of the Mediterranean region. Its leaves are used to garnish salads and therefore the roots feature regularly in Thai preparation. However, the small fruits are the most vital a part of the plant and are an important ingredient of curry powders. It's also utilized in a variety of savoury dishes, desserts and confectioneries, also as in liqueurs and perfumes[8].It contains phytonutrients such

as caffeic acid, camphene, chlorogenic acid, isoquercitrin, myrcene, quercetin, rutin, vanillic acid, angelicin, apigenin, beta-sitosterol, borneol, camphor, cineole, cinnamic acid, geraniol, limonene, myristicin, terpinenes[20].Coriander's antitumorigenic properties like colon cancer. It protects against the damaging effects of lipid oxidation related to this malignancy. It lowers sterol and triglyceride levels, serving to reduce the risk of atherosclerosis and thereby coronary failure and stroke. It works both by enhancing the secretion of insulin from the exocrine gland and exhibiting insulin like activity at cellular level. Chelation compounds found in coriander leaves are powerful chelators of toxic heavy metals. They have been shown specifically to assist and to eliminate lead deposits from the kidneys and bones[19].

8) *Cardamom*: Cardamomor Elettaria cardamomum is one of the most vital spices in several eastern cuisines and is used in middle eastern countries for flavouring coffee. It's a known breath freshener. It belongs to Zingiberaceae famiy. Collectively of the highest priced of the spices, cardamom is exceeded in price solely in saffron and vanilla. Cardamom contains many necessary antioxidants, particularly the anti-inflammatory and cardioprotective salicylates. Cardamom contains linalool which is known as antiviral agent.It contains phytonutrients such as caffeic acid, camphene, cyanidin, gamma-terpinene, gamma-tocopherol, salicylates, cineole, camphor, linalool, palmitic acid, cymene, stearic acid, terpinene, vanillic acid[20, 22].

9) *Chili pepper*: Chili peppers or Capsicum annuum that belong to the genus Solanaceae. Chillies are capsicums, "New World" spices that are described by several species and cultivars, as well as paprika and red peppers. The quantities of the phytochemicals found in capsicums vary significantly between the various cultivars. Chillies tend to possess very high concentrations of capsaicin which offers plants of their robust flavour and irritant effects. Paprika and sweet red peppers contain smaller quantities of capsaicin, yetcapsiate is another important phytochemical with higher concentrations in them[8, 19].It contains phytonutrients such as caffeic acid, capsaicin, chlorogenic acid, coumaric acid, ferulic acid, hesperidin, lutein, myrcene, quercetin, rutin, salicylates, scopoletin, carotenoid, capsiate, capsidol, limonene, zeaxanthin[20].Capsaicin has essential antitumorigenic properties, specifically as a strong inducer of apoptosis in liver cancer cells. Study has shown that capsaicin protects against both respiratory organ and glandular cancer. Its immunosuppressive effects are connected to its ability to suppress nuclear factor-kappaB protein (NF-κB) activation. Considered as a novel blocker of the Signal transducer and activator of transcription (STAT)3 activation pathway, with the prevention and treatment of multiple malignant neoplasm and other cancers. Both capsaicin and capsiate raise the body's metabolic rate and increase the rate of fat "burn-off". Capsaicin has the additional advantage of suppressing the appetite through its direct impact on the brain's satiation centre and by stimulating the discharge of anorectic hormones, like cholecystokinin, by the intestines. An analysis has shown that capsicums to be very effective for the treatment of acute and chronic pain related to shingles and arthritis. Further, acts as a counter-irritant or a stimulant of the body's natural endorphin painkillers. Also, useful to regulate the symptoms of irritable bowel syndrome[22].

10) *Fenugreek*: The seeds are the most valuable part of the fenugreek or Trigonella foenum-graecum plant of Fabaceae family and have been used as a nutritious dietary spice in middle east, India and the far east. It's additionally a main constituent of curries. In traditional medicine, used to treat various conditions together with diabetes, sore throats, and abscesses. However, for enhancing normal physiological processes, with reference to athletic performance. In diabetics, individual suffer from lipid imbalances, thus study demonstrated a notable ability to lower cholesterol, triglycerides and lipoprotein levels. It's additionally effective against diabetes related cataracts that occur usually in diabetics. One of its properties is the reduction of blood platelet aggregation that, in turn, intensely reduces the chance of abnormal blood coagulation related to heart attacks and strokes. It contains several antioxidants and has the added benefit of protecting alternative dietary and internally created antioxidants from free radical damage. This has necessary cardioprotective advantages, as well as helping to support the body against a variety of other chronic conditions. One of the richest sources of phytoestrogens which is useful spice tofemales who have low oestrogen levels. It contains phytonutrients such as apigenin, coumaric acid, genistein, isoorientin, isoquercitrin, isovitexin, kaempferol, lignin, luteolin, orientin, phytic acid, quercetin, quercitrin, rutin, selenium, superoxide-dismutase, vitexin, diosgenin, fenugreekine, trigonelline[19, 20]. Research has shown that diosgenin suppresses proliferation and induces apoptosis in cells of human colon carcinoma, osteosarcoma, leukemia, and human autoimmune disorder. Thus, it suppresses proliferation, osteoclastogenesis, and inhibits invasion, through inhibition of NF-κB-regulated gene expression and enhances apoptosis induced by cytokines and chemotherapeutical agents[22].

III. CONCLUSION

Nature is a distinctive source of different structures of high phytochemical diversity, several of them possessing attention grabbing biological activities and medicinal properties. Because of the worldwide spread of different diseases like AIDS, diabetes,

cardiovascular diseases, cataract, chronic diseases and a range of cancers, a thorough hunt for new lead compounds for the development of novel pharmacological medicine is required. Use of spices is like taking advantage of plant defensive compounds. The current information reported in this review, conclude that it's difficult to determine clear functionality and structure–activity relationships about the effects of phytochemicals in biological systems activity. The spices contain phytochemical which seemed to have the potential ability to act as a good source of useful medicine and also to enhance the health status of the individual which is also reported in traditional usage of spices. This study would help to determine some compounds that are very useful for the producing valuable medicine. The review study includes black pepper, turmeric, cinnamon, garlic, ginger, clove, coriander, cardamom, chili pepper, and fenugreek, which contains a range of compounds like alkaloids, tannins, flavonoids, phenols etc. which could be accountable for various activities. These phytochemicals have antioxidant, antimicrobial, antifungal, antimalarial, antiallergenic, anti-inflammatory, antibacterial, anticarcinogenic, antiseptic, antidepressant, and antiviral properties. Also, have effect against Alzheimer's and Parkinson's like diseases. The use of spices primarily borrows plants recipes for survival and puts them to similar use in cooking. However, there's a limit of usage of spice before these useful phytochemicals become phytotoxins. Some of the associations between specific phytochemicals and disease condition reduction are very convincing, however more information is required.

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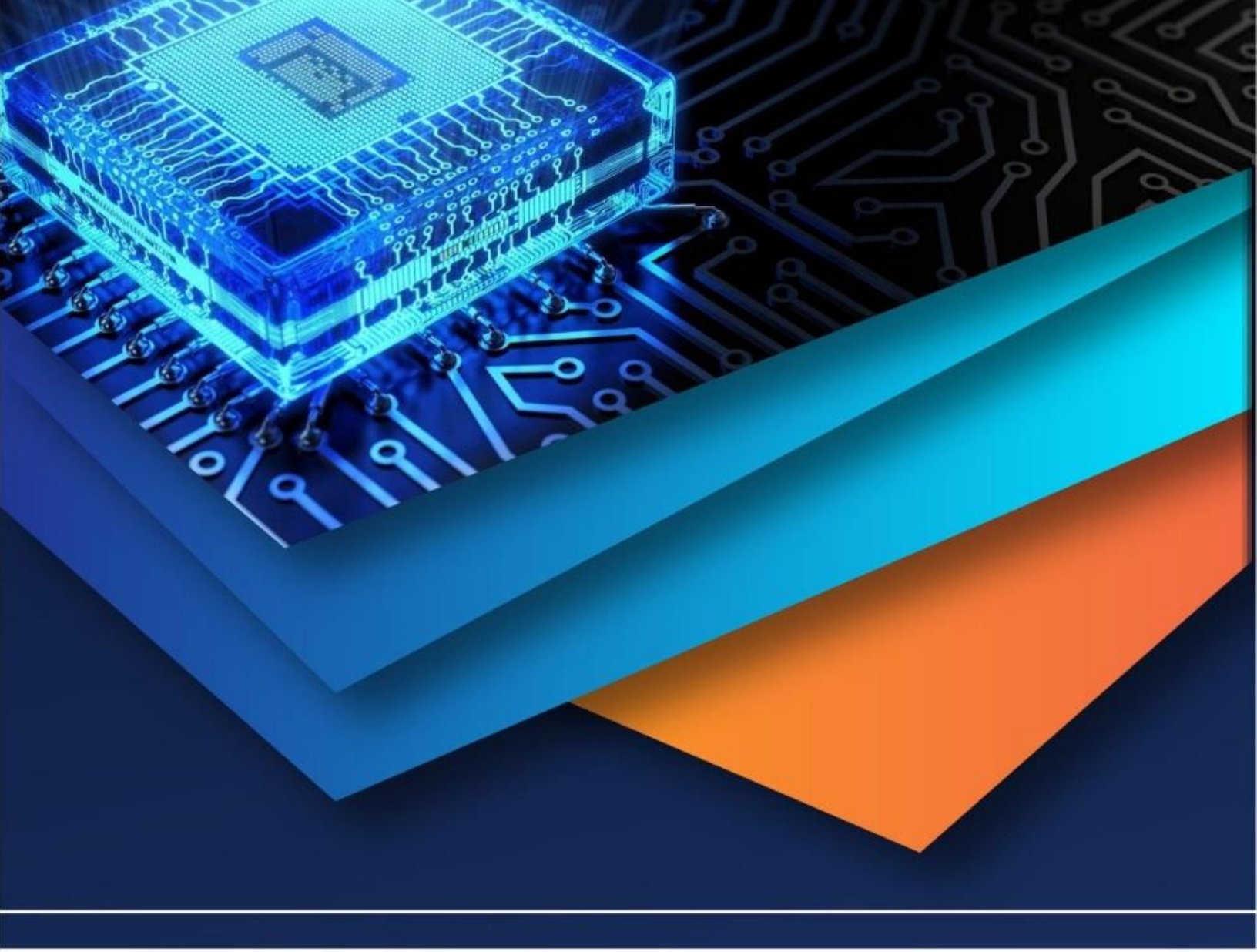

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