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Spices, Herbs and Their Overall Health Benefits

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ABSTRACT

Modern science is beginning to uncover the ultimate power of spices and herbs, as weapons against illnesses from cancer to Alzheimer's disease. Here we have gathered some of the healthiest spices and herbs enjoyed around the world that can lower blood sugar, triglycerides, Low Density Lipoprotein (LDL), and total cholesterol in people with type 2 diabetes, which can inhibit the growth of cancer cells, gene mutations that could lead to cancer and may help prevent damage to the blood vessels that raise heart attack, risk decrease motion sickness and nausea; may also relieve pain and swelling associated with arthritis. Destroys cancer cells and may disrupt the metabolism of tumor cells, anti-inflammatory and antioxidant effects may lower the risk of cancer. There's no specific recommended dose, but moderation is probably the best way to go. Ginger also hinder blood clotting. Studies show that capsaicin can increase the body's metabolic rate causing one to burn more calories and may stimulate brain chemicals that help us feel less hungry. Some herbs like sage higher the levels of vitamin K, an essential vitamin for the body that isn't found in many foods. Vitamin K is a crucial element in developing bone density and ensuring the integrity of our bones as we age. Herbs help prevent osteoporosis. Saffron's ability is to influence the neurotransmitter serotonin. Lowers Insulin resistance Insulin resistance a condition in which our body cells stop responding normally to the hormone insulin is a leading factor in the development of diabetes.

INTRODUCTION

Most of us have herbs and spices in our kitchen cabinet somewhere and they often get haphazardly added to recipes and culinary creations. Interestingly, there are many health benefits of herbs and spices, not to mention they improve the taste of so many foods (2). The problem is, most herbs and spices have been sitting on a grocery store shelf for a long time, and thus they don't have much nutritional value left. Growing them our self whenever possible, but if you can't, always purchase high quality organic ones. All spices originate from plants: flowers, fruits, seeds, barks, leaves, and roots. Herbs and spices not only improve the taste of foods, but can help preserve them for longer periods of time (12). Herbs and Spices have antibacterial and antiviral properties and many are high in B-vitamins and trace minerals. True sea salt, for instance, contains 93 trace minerals. Most herbs and spices also contain more disease fighting antioxidants than fruits and vegetables (16). While the least potent salt and pepper are the most commonly used seasonings. Cinnamon has the highest antioxidant value of any spice. It has been shown to reduce inflammation and lower blood sugar and blood triglyceride levels. Cinnamon has also been used to alleviate nausea and to increase sensitivity to insulin and aid in fat burning (8). It provides manganese, iron and calcium. Its antimicrobial properties can help extend the life of foods. While cinnamon is an incredibly healthy and nutritious spice, it is often hard to branch out from the most common uses of cinnamon: cookies, muffins and desserts. Other places in the world cinnamon is used in savory and sweet dishes, everything from breakfast to dessert. Basil has anti-inflammatory and antiviral properties and can help prevent osteoarthritis (16). It has been used in digestive disorders and is being studied for its anti-cancer properties. Arrowroot is a starchy herb that I keep on hand, especially since we went gluten free. It has an amazing thickening ability similar to cornstarch, and it can be added to soups, dips, baking etc (79). Arrowroot can be used in place of flour for a roux or as the main baking ingredient in a gluten free teething biscuit for kids (17). It is soothing and highly digestible so it is often used in treatment for conditions like Irritable Bowel Syndrome. Turmeric is often found in kitchens around the world, it contains Curcumin, a cancer-fighting compound. It is more often taken medicinally in America for its ability to reduce inflammation and improve joints. Fresh cloves are always best, but powdered, minced and granulated forms provide excellent flavor (78). Studies show that just 2 fresh cloves a week provide anti-cancer benefits. Dill Weed/Seed Dill has antibacterial properties but is most known for its stomach settling ability

ever wonder why pregnant women crave pickles. It contains a variety of nutrients but loses most when heated to high temperatures (45).

METHODOLOGY

Sufficient literature survey has been done to review the updated information on the Spices and Herbs including their role for health, studies addressing risk factors of different diseases and infections from past fifteen years (2000-2015). Human studies were preferred over animal and in vitro experiments. Spices and Herbs have a great role as per research is concern for human health and is debated to what extent we can generalize evidence of Spices and Herbs on humans. Scientific studies were obtained from Scopus, Science Direct and Web databases, Scholar Google and PubMed, respectively. Background theory, laws and directives were obtained from reports (national, EU, WHO), web pages, and textbooks. EU- reports were used because they have been much debated, and there have been frequent meetings about Spices and Herbs in scientific committees in the EU- system.

RESULTS AND DISCUSSIONS

Some of the most common spices and herbs which are used worldwide and their health benefits are as follows.

1, Chile Peppers; Gives boost to your metabolism. Capsaicin, the compound that gives fresh chiles, and spices including cayenne and chipotle, their kick. Studies show that capsaicin can increase the body's metabolic rate (causing one to burn more calories) and may stimulate brain chemicals that help us feel less hungry. In fact, one study found that people ate 16 percent fewer calories at a meal if they'd sipped a hot-pepper-spiked tomato juice (vs. plain tomato juice) half an hour earlier (18). Recent research found that capsinoids, similar but gentler chemicals found in milder chile hybrids, have the same effects so even tamer sweet paprika packs a healthy punch. Capsaicin may also lower risk of ulcers by boosting the ability of stomach cells to resist infection by ulcer causing bacteria and help the heart by keeping bad LDL cholesterol from turning into a more lethal, artery clogging form (59). Chiles contains up to seven times the vitamin C level of an orange and has a range of health benefits, including fighting sinus congestion, aiding digestion and helping to relieve migraines and muscle, joint and nerve pain. It's also a good source of vitamins A and E, beta-carotene, folic acid and potassium (60). Chili peppers nutrition facts Chili peppers, despite their fiery hotness, are one of the very popular spices known for their medicinal and health benefiting

properties. The chili is a fruit pod of the plant belonging to the nightshade family (Solanaceae), of the genus, Capsicum. Scientific name: Capsicum annuum. Chilies have a strong spicy taste that comes to them from the active alkaloid compounds: capsaicin, capsanthin, and capsorubin.

Health benefits of chili peppers. Chili pepper contains an impressive list of plant derived chemical compounds that are known to have disease preventing and health promoting properties (59). Chilies contain health benefiting an alkaloid compound, capsaicin, which gives them strong spicy, pungent character. Early laboratory studies on experimental mammals suggest that capsaicin has anti-bacterial, anti-carcinogenic, analgesic and anti-diabetic properties (73). It also found to reduce LDL cholesterol levels in obese. Fresh chili peppers, red and green, are a rich source of vitamin-C. 100 g fresh chilies provide about 143.7 µg or about 240% of RDA. Vitamin-C is a potent water-soluble antioxidant. It is essential for the collagen synthesis inside the human body (36). Collagen is one of the main structural protein required for maintaining the integrity of blood vessels, skin, organs, and bones. Regular consumption of foods rich in vitamin-C helps protect from scurvy, develop resistance against infectious agents (boosts immunity), and scavenge harmful, pro-inflammatory free radicals from the body (41). They are also good in other antioxidants such as vitamin-A, and flavonoids like β-carotene, α-carotene, lutein, zeaxanthin, and cryptoxanthin (75). These antioxidant substances in capsicum help protect the body from injurious effects of free radicals generated during stress, diseases conditions. Chilies carry a good amount of minerals like potassium, manganese, iron, and magnesium (40). Potassium is an important component of cell and body fluids that helps controlling heart rate and blood pressure. The human body use manganese as a co-factor for the antioxidant enzyme, superoxide dismutase (60). Chilies are also good in the B-complex group of vitamins such as niacin, pyridoxine (vitamin B-6), riboflavin and thiamin (vitamin B-1) (27). These vitamins are essential in the sense that human body requires them from external sources to replenish. Chili peppers have amazingly high levels of vitamins and minerals. Just 100 g provides (in % of recommended daily allowance):

240% of vitamin-C (Ascorbic acid),

39% of vitamin B-6 (Pyridoxine),

32% of vitamin A,

13% of iron,

14% of copper,

7% of potassium,

2. Ginger; Fight arthritis pain. Ginger has a well-deserved reputation for relieving an unsettled stomach. Studies show ginger extracts can help reduce nausea caused by morning sickness or following surgery or chemotherapy, though it's less effective for motion sickness (22). But ginger is also packed with inflammation fighting compounds, such as gingerols, which some experts believe may hold promise in fighting some cancers and may reduce the aches of osteoarthritis and soothe sore muscles. In a recent study, people who took ginger capsules daily for 11 days reported 25 percent less muscle pain when they performed exercises designed to strain their muscles (compared with a similar group taking placebo capsules) (20). Another study found that ginger-extract injections helped relieve osteoarthritis pain of the knee. Ginger Contains Gingerol, a substance with powerful medicinal properties. ginger can treat many forms of nausea, especially morning sickness (13). Ginger may reduce muscle pain and soreness. Ginger is among the healthiest (and most delicious) spices on the planet (67). It is loaded with nutrients and bioactive compounds that have powerful benefits for your body and brain (13). Here are 11 health benefits of ginger that are supported by scientific research. Ginger is a flowering plant that originated from China. It belongs to the Zingiberaceae family and is closely related to turmeric, cardamom and galangal (18). The rhizome (underground part of the stem) is the part commonly used as a spice. It is often called ginger root, or simply ginger (72). Ginger has a very long history of use in various forms of traditional/alternative medicine. It has been used to help digestion, reduce nausea and help fight the flu and common cold (24). Ginger can be used fresh, dried, powdered, or as an oil or juice, and is sometimes added to processed foods and cosmetics. It is a very common ingredient in recipes. The unique fragrance and flavor of ginger come from its natural oils, the most important of which is gingerol (4). Gingerol is the main bioactive compound in ginger, responsible for much of its medicinal properties. It has powerful anti-inflammatory and antioxidant effects (1). Ginger is a popular spice. It is high in gingerol, a substance with powerful anti-inflammatory and antioxidant properties (2). Ginger can treat many forms of nausea, especially morning sickness (72). Ginger appears to be highly effective against nausea (2).For example, it has a long history of use as a sea sickness remedy, and there is some evidence that it may be as effective as prescription medication (3).

Ginger may also relieve nausea and vomiting after surgery, and in cancer patients undergoing chemotherapy (4, 5). But it may be the most effective when it comes to pregnancy-related nausea, such as morning sickness. Although ginger is considered safe, talk to your doctor before taking large amounts if you are pregnant. Some believe that large amounts can raise the risk of miscarriage, but there are currently no studies to support this. 1-1.5 grams of ginger can help prevent various types of nausea (26). This applies to sea sickness, chemotherapy-related nausea, nausea after surgery and morning sickness (3). Ginger May Reduce Muscle Pain and Soreness. Ginger has been shown to be effective against exercise-induced muscle pain. In one study, consuming 2 grams of ginger per day, for 11 days, significantly reduced muscle pain in people performing elbow exercises (7). Ginger does not have an immediate impact but may be effective at reducing the day-to-day progression of muscle pain (8). These effects are believed to be mediated by the anti-inflammatory properties. Ginger appears to be effective at reducing the day-to-day progression of muscle pain and may reduce exercise-induced muscle soreness (4). The Anti-Inflammatory Effects Can Help With Osteoarthritis (72). Osteoarthritis is a common health problem. It involves degeneration of the joints in the body, leading to symptoms like joint pain and stiffness. In a controlled trial of 247 people with osteoarthritis of the knee, those who took ginger extract had less pain and required less pain medication (9). Another study found that a combination of ginger, mastic, cinnamon and sesame oil, can reduce pain and stiffness in osteoarthritis patients when applied topically (10). There are some studies showing ginger to be effective at reducing symptoms of osteoarthritis, which is a very common health problem (5). Ginger may drastically lower blood sugars and improve heart disease risk factors. This area of research is relatively new, but ginger may have powerful anti-diabetic properties. In a recent 2015 study of 41 participants with type 2 diabetes, 2 grams of ginger powder per day lowered fasting blood sugar by 12% (11). It also dramatically improved HbA1c (a marker for long-term blood sugar levels), leading to a 10% reduction over a period of 12 weeks (62). There was also a 28% reduction in the ApoB/ApoA-I ratio, and a 23% reduction in markers for oxidized lipoproteins. These are both major risk factors for heart disease. However, keep in mind that this was just one small study. The results are incredibly impressive, but they need to be confirmed in larger studies before any recommendations can be made. Ginger has been shown to lower blood sugar levels and improve various heart disease risk factors in patients with type 2 diabetes (6). Ginger can help treat chronic indigestion chronic indigestion (dyspepsia) is characterized by recurrent pain and discomfort in the upper part of the stomach. It is believed that delayed emptying of the stomach is a major driver of indigestion.

Interestingly, ginger has been shown to speed up emptying of the stomach in people with this condition. After eating soup, ginger reduced the time it took for the stomach to empty from 16 to 12 minutes (12). In a study of 24 healthy individuals, 1.2 grams of ginger powder before a meal accelerated emptying of the stomach by 50% (13). Ginger appears to speed up emptying of the stomach, which can be beneficial for people with indigestion and related stomach discomfort.7. Ginger powder may significantly reduce menstrual pain menstrual pain (dysmenorrhea) refers to pain felt during a woman's menstrual cycle. One of the traditional uses of ginger is for pain relief, including menstrual pain. In one study, 150 women were instructed to take 1 gram of ginger powder per day, for the first 3 days of the menstrual period (14). Ginger managed to reduce pain as effectively as the drugs mefenamic acid and ibuprofen. Ginger appears to be very effective against menstrual pain when taken at the beginning of the menstrual period. 8. Ginger may lower cholesterol levels high levels of LDL lipoproteins (the "bad" cholesterol) are linked to an increased risk of heart disease. The foods you eat can have a strong influence on LDL levels. In a 45-day study of 85 individuals with high cholesterol, 3 grams of ginger powder caused significant reductions in most cholesterol markers (15). This is supported by a study in hypothyroid rats, where ginger extract lowered LDL cholesterol to a similar extent as the cholesterol-lowering drug atorvastatin (16). Both studies also showed reductions in total cholesterol and blood triglycerides. There are some evidence, in both animals and humans, that ginger can lead to significant reductions in LDL cholesterol and blood triglyceride levels (9). Ginger contains a substance that may help prevent cancer, Cancer is a very serious disease that is characterized by uncontrolled growth of abnormal cells (13). Ginger extract has been studied as an alternative treatment for several forms of cancer. The anti-cancer properties are attributed to 6-gingerol, a substance that is found in large amounts in raw ginger (17, 18). In a study of 30 individuals, 2 grams of ginger extract per day significantly reduced pro-inflammatory signaling molecules in the colon (19). However, a follow-up study in individuals at a high risk of colon cancer did not confirm these findings (20). There is some, albeit limited, evidence that ginger may be effective against pancreatic cancer, breast cancer and ovarian cancer. More research is needed (21, 22, and 23). Ginger contains a substance called 6-gingerol, which may have protective effects against cancer. However, this needs to be studied a lot more (10). Ginger may improve brain function and protect against Alzheimer's disease Oxidative stress and chronic inflammation can accelerate the aging process. They are believed to be among the key drivers of Alzheimer's disease and age-related cognitive decline. Some studies in animals suggest that the antioxidants and bioactive compounds in

ginger can inhibit inflammatory responses that occur in the brain (24). There is also some evidence that ginger can enhance brain function directly. In a study of 60 middle-aged women, ginger extract was shown to improve reaction time and working memory (25). There are also numerous studies in animals showing that ginger can protect against age-related decline in brain function (26, 27, and 28). It can also improve brain function in elderly women. The active ingredient in ginger can help fight infections Gingerol, the bioactive substance in fresh ginger, can help lower the risk of infections. In fact, ginger extract can inhibit the growth of many different types of bacteria (29, 30). It is very effective against the oral bacteria linked to inflammatory diseases in the gums, such as gingivitis and periodontitis (31). Fresh ginger may also be effective against the Respiratory Syncytial Virus (RSV), a common cause of respiratory infections (32). Ginger is one of the very few "superfoods" actually worthy of that term. An evidence-based nutrition article from our experts at Authority Nutrition.

3. Cinnamon: Stabilize blood sugar. A few studies suggest that adding cinnamon to food up to a teaspoon a day, usually given in capsule form might help people with type 2 diabetes better control their blood sugar, by lowering post meal and blood sugar spikes. Other studies suggest the effects are limited at best. High source of antioxidants. Contains anti-inflammatory properties that protects heart (61). Cinnamon is a powerful spice that has been used medicinally around the world for thousands of years. It is still used daily in many cultures because of its widespread health benefits, not to mention its distinctly sweet, warming taste and ease of use in recipes (70).

Helps Fight Diabetes.

Helps Defend Against Cognitive Decline & Protects Brain Function.

May Help Lower Cancer Risk.

Fights Infections & Viruses.

Protects Dental Health & Freshens Breath Naturally.

According to researchers, out of twenty-six of the most popular herbs and medicinal spices in the world, cinnamon actually ranks 1 in terms of its protective antioxidant levels (1) The unique smell, color and flavor of cinnamon is due to the oily part of the tree that it grows

from. The health benefits of cinnamon come from the bark of the Cinnamomum verum (Cinnamomum zeylanicum) tree. The Cinnamomum verum tree can also be synonymously referred to as a Cinnamomum zeylanicum (43). These scientific terms simply refer to a true cinnamon tree. This bark contains several special compounds which are responsible for its many health-promoting properties, including cinnamaldehyde, cinnamic acid and cinnamate (21). Researchers have concluded that cinnamon health benefits can be obtained in the form of its pure bark, essential oils, in ground spice form (which is bark powder) or in extract form when its special phenolic compounds, flavonoids and antioxidants are isolated. These compounds make cinnamon one of the most beneficial spices on earth, giving it antioxidant, anti-inflammatory, anti-diabetic, anti-microbial, immunity-boosting and potential cancer and heart disease-protecting abilities. (2)

Nutrition Benefits of Cinnamon

One tablespoon of ground cinnamon contains:

19 calories

0 grams of fat, sugar, or protein

4 grams of fiber

68 percent daily value manganese

8 percent daily value calcium

4 percent daily value iron

3 percent daily value vitamin K

A little bit of cinnamon goes a long way, and its antioxidant abilities are what makes it especially beneficial to include in your diet. As little as ½ teaspoon of cinnamon daily can have positive effects on blood sugar levels, digestion, immunity and more; however, stronger doses are also extremely beneficial for improving heart disease risk and cutting your risk of diabetes, cancer and neurodegenerative diseases (65). High source of antioxidants cinnamon is packed with a variety of protective antioxidants that reduce free radical damage and slow the aging process; in fact, researchers have identified 41 different protective compounds of cinnamon to date! (4) (5) According to the ORAC scale, which is used to measure the

concentration of antioxidants in different foods, cinnamon ranks **7** of all foods, spices and herbs across the world. And in a study that compared the antioxidant activity of 26 spices, cinnamon was deemed the winner and proved to be higher in antioxidants than other powerful herbs and spices, including garlic, thyme, rosemary and oregano (27). Cinnamon health benefits are attributed to the type of antioxidants called polyphenols, phenolic acid and flavonoids (29). These are similar antioxidants to those that can be found in other "superfoods," including berries, red wine and dark chocolate. These compounds work to fight oxidative stress in the body, which can lead to disease formation when uncontrolled, especially as someone ages (55). Different antioxidants present in cinnamon help to reduce a number of symptoms and diseases because they are free radical scavengers. The health benefits of cinnamon include its ability to reduce many forms of oxidative stress, including the ability to limit nitric oxide build up in the blood and lipid (fat) peroxidation, which can both add to instances of brain disorders, cancer, heart disease and other conditions. (6). Contains anti-inflammatory properties The antioxidants in cinnamon have anti-inflammatory effects, which may help lower the risk of heart disease, cancer, brain function decline and more. Researchers have identified over seven kinds of flavonoid compounds alone in cinnamon, which are highly effective at fighting dangerous inflammation levels throughout the body (11). Because cinnamon lowers swelling and inflammation, it can be beneficial in pain management, with studies showing that cinnamon helps to relive muscle soreness, PMS pains, severity of allergic reactions and other age-related symptoms of pain too. (7,8). protects heart health studies have shown that another health benefit of cinnamon is that it reduces several of the most common risk factors for heart disease, including high cholesterol levels, high triglyceride levels and high blood pressure. (9) The special compounds in cinnamon are able to help reduce levels of total cholesterol, LDL "bad" cholesterol and triglycerides, while High Density Lipoprotein (HDL) "good" cholesterol remains stable. Cinnamon has also been shown to reduce high blood pressure, which is another threat for causing heart disease or a stroke. (10) And there are even more heart health benefits of cinnamon. Research shows that cinnamon is a helpful blood coagulant and prevents bleeding by helping the body to form blood clots. Cinnamon also increases blood circulation and advances bodily tissue's ability to repair itself after it's been damaged (56). This includes heart tissue, which is in need of regeneration in order to help fight heart attacks, heart disease and stroke. Helps fight diabetes cinnamon is known to have an anti-diabetic effect. It helps lower blood sugar levels and also can improve sensitivity to the hormone insulin, which is the vital hormone needed for keeping blood sugar levels balanced. (11) Diabetes is formed when

insulin resistance occurs and poor glycemic control takes places, or someone develops the inability to manage how much sugar (glucose) enters the bloodstream. The same problem with insulin resistance is also associated with other conditions like metabolic syndrome and weight gain, too (73). These benefits of cinnamon exist because it plays a part in blocking certain enzymes called alanine's, which allows for glucose (sugar) to be absorbed into the blood (61). Therefore, it has been shown to decrease the amount of glucose that enters the bloodstream after a high-sugar meal, which is especially important for those with diabetes. For this reason, many studies have shown that people with type 2 diabetes can experience significant positive effects on blood sugar markers by supplementing with cinnamon extract. (12). Helps defend against cognitive decline & protects brain function research also shows that another benefit of cinnamon's protective antioxidant properties is they can help defend the brain against developing neurological disorders, such as **Parkinson's and Alzheimer's diseases**. (13) One way cinnamon protects cognitive function and brain health is by activating neuro-protective proteins that protect brain cells from mutation and undergoing damage. This further reduces the negative effects of oxidative stress by stopping cells from morphing and self-destructing (9). Because cinnamon contains so many antioxidants and anti-inflammatory compounds that reduce the effects of aging on the body and brain, in the future, we may see it being used as a possible natural therapeutic treatment or prevention for age-related neurodegenerative diseases. Cinnamon may help lower cancer risk because of its antioxidant abilities, cinnamon can help protect against DNA damage, cell mutation and cancerous tumor growth (32). Studies have revealed the health benefits of cinnamon that come from a compound called cinnamaldehyde include its possible ability to inhibit cancer tumor growth and protect DNA from damage, while also encouraging cancerous cells to self-destruct called cell apoptosis. (14) This is especially true in the colon; studies show that cinnamon can improve the health of the colon, thereby reducing the risk of colon cancer. (15) Cinnamon is now being investigated as a natural anti-cancer agent because of its strong antioxidant abilities, so in the future, it may be useful for those who are at higher risks for cancer to supplement with cinnamon extract. Fights infections & viruses there are many benefits of cinnamon when it comes to defending the body from illnesses. Cinnamon is a natural anti-microbial, antibiotic, anti-fungal and anti-viral agent. The immune-boosting abilities of cinnamon are found in cinnamon's essential oils.(16) Cinnamon is used in many cultures to naturally help fight harmful infections and viruses. Cinnamon oils also have protective abilities against various bacteria which can cause negative symptoms in the digestive tract, on the surface of the skin, and can lead to colds or the flu. Cinnamon protects dental health &

freshens breath naturally in studies, the extracts found in cinnamon were shown to be protective against bacteria living in the oral microflora that could cause bad breath, tooth decay, cavities or mouth infections (58). The essential oil from cinnamon has been shown to be more potent than other tested plant extracts and can be used to naturally combat bacteria in the mouth, acting like a natural anti-bacterial mouthwash. Similarly to peppermint, one of the health benefits of cinnamon is that it can also use as a natural flavoring agent in chewing gums due to its mouth refreshing abilities (46). Because it removes oral bacteria, cinnamon has the ability to naturally remove bad breath without adding any chemicals to the body. For this reason cinnamon has also been traditionally used as tooth powder and to treat toothaches, dental problems, oral microbiota, and mouth sores. (17) Cinnamon essential oil is also used in some beauty products, **shampoos, and perfumes** for its many health benefits that can help with fighting infection while adding a pleasant smell. Cinnamon can help prevent or cure candida certain studies have concluded that cinnamon's powerful anti-fungal properties may be effective in stopping or curing candida overgrowth in the digestive tract. (18) Cinnamon has been shown to lower amounts of dangerous Candida albicans, which is the yeast that causes candida overgrowth that can cause multiple digestive and autoimmune symptoms (22). Additionally, another health benefit of cinnamon is that it helps to control blood sugar levels, and too much sugar within the digestive tract is associated with increased candida risk. According to researchers, when patients were given cinnamon extract or cinnamon essential oil, they showed improvements in candida yeast levels and a reduction in symptoms. Cinnamon helps to fight candida naturally by boosting immune health and fighting inflammation, auto immune-reactions, and yeast within the gut. Benefits skin health cinnamon has anti-biotic and anti-microbial effects that protect skin from irritations, rashes, allergic reactions, and infections. Applying cinnamon essential oil directly to the skin can be helpful in reducing inflammation, swelling, pain, and redness. (19) Cinnamon and honey, another antimicrobial ingredient, are frequently used together to boost skin health for this reason and are beneficial for acne, rosacea, and signs of skin allergies. Cinnamon helps fight allergies studies have concluded that those with allergies can find relief thanks to the benefits of cinnamon's compounds (39). Cinnamon has been shown to be helpful in fighting common allergy symptoms because it reduces inflammation and fights histamine reactions in the bodies of animals, although research is yet to come in human trials. (20, 21 & 22) For that reason, many naturopaths believe it can also help to reduce symptoms of asthma attacks. In essential oil form, cinnamon may have immune-boosting abilities and is beneficial for nutrient absorption during digestion according to lab and animal studies, which could cut

down on auto-immune reactions that can take place after consuming common allergen foods. (23, 24 & 25). One of the benefits of cinnamon over sugar is that it contains no sugar and no calories in amounts that it is used by most people, so it makes an extremely healthy addition to many meals, especially considering its many nutrients (47). Also used as a natural food preservative one of the less-known benefits of cinnamon is that it can be used to preserve food. Because cinnamon has anti-bacterial abilities and also acts as an antioxidant, it can be used as a preservative in many foods without the need for chemicals and artificial ingredients. (26) A recent study reported that when pectin from fruit was coated with cinnamon leaf extract it yielded high antioxidant and antibacterial activities and stayed fresh for longer. Cinnamon plays a part in the action of tyrosinase inhibitors, which are useful in stopping discoloration on fruits and vegetables that appears as they oxidize and begin to rot.

4. Turmeric; Inhibit tumors. Turmeric, the golden rod colored spice, is used in India to help wounds heal it's applied as a paste; it's also made into a tea to relieve colds and respiratory problems. Modern medicine confirms some solid-gold health benefits as well; most are associated with curcumin, a compound in turmeric that has potent antioxidant and anti-inflammatory properties (61). Curcumin has been shown to help relieve pain of arthritis, injuries and dental procedures; it's also being studied for its potential in managing heart disease, diabetes and Alzheimer's disease (34). Researcher is bullish on curcumin's potential as a cancer treatment, particularly in colon, **prostate and breast cancers**; preliminary studies have found that curcumin can inhibit tumor cell growth and suppress enzymes that activate carcinogens. Turmeric is a **'miracle herb'**. You have heard this one quite a number of times. But what makes this herb so miraculous (67). Bioactive ingredients found in this herb are pleiotropic in nature the same molecule can bind to a variety of enzymes and other molecular targets in the body. Here are some health benefits of turmeric, curcumin is the compound in turmeric that has potent anti-inflammatory property (61). As an anti-inflammatory agent, it inhibits the activity of nuclear factor kappa B- the master protein that regulates inflammatory process. Like conventional anti-inflammatory agents, it inhibits the activity of inflammatory enzymes such as Cyclooxygenase (COX) and LOX. Additionally, it inhibits the activity of various inflammatory chemicals and proteins such as TNF-alpha, interleukin etc. One advantage over conventional anti-inflammatory agents is that turmeric does not cause gastric side effects. Curcumin free turmeric is also found to have anti-inflammatory property. Curcumin's anti-inflammatory property contributes to its painkiller property (34). Its inhibitory action on inflammatory chemicals like prostaglandins and interleukins helps in

reducing pain. This painkiller property has been found to be useful in dealing with post-surgical pain and burn injuries. Additionally, curcumin is also found to relieve neuropathic pain which is similar to pins and needles sensation (67). Even turmeric oil has analgesic properties and research shows that its painkiller properties are comparable to aspirin. Curcuminoids present in turmeric are strong antioxidants. Their antioxidant activity is comparable to vitamin C and E. As antioxidants they function in 3 ways 1. Reduce oxidative stress or imbalance between prooxidant and antioxidant species in the body 2. Raise the level of antioxidant enzymes 3. Scavenge free radical species that cause oxidative damage thus they ameliorate oxidative stress in conditions like **diabetes and thalassemia**. Turmeric benefits in acid reflux or GERD in multiple ways. It improves digestion, exerts bactericidal effect on H.pylori infection, prevents the formation of ulcers, soothes inflammation and even protects from silent reflux. Research shows that curcumin can prevent and treat pancreatitis. Its anti-inflammatory activity benefits in pancreatitis (5). It reduces severity of various types of arthritis. Curcumin has multiple ways in treating rheumatoid arthritis:

a. It acts as an anti-inflammatory agent.

b. It improves antioxidant defenses.

c. It ameliorates autoimmune reactions.

d. It protects bone cells.

Supplementation of curcumin in individuals suffering from rheumatoid arthritis is found to significantly reduce pain and improve joint function better than conventional therapy (56). It is also beneficial in pancreatic cancer however, if taken at high doses or an empty stomach, it may trigger acid reflux in some it protects bone in osteoarthritis Research shows that curcumin formulations outperform conventional anti-arthritic drugs prescribed in osteoarthritis (54). Curcumin also protects bone tissue and prevents bone loss It can help in healing of bone fractures traditionally turmeric has been used in treatment of bone fractures. Topically turmeric paste is applied to affected region and turmeric milk is also ingested to hasten healing (6). The mechanism behind this is that turmeric controls inflammatory process and helps in reducing pain. Further turmeric helps protect bone tissue and aids in bone remodeling.

Benefits of Turmeric in Thalassemia. Thalassemia is an inherited blood disorder. It is characterised by defective formation of haemoglobin. Haemoglobin is a protein that enables red blood cells to carry oxygen from the lungs to other parts of the body. The abnormal haemoglobin produced impairs oxygen transport in the body and leads to destruction of red blood cells. Reduced oxygen leads to fatigue and anemia. Individuals present with cold hands and feet, shortness of breath, pale skin, bone deformities and delayed growth. One of the complications associated with thalassemia is iron overload. This arises either due to the illness itself or due to blood transfusion. Excessive iron deposits cause damage to organs **like liver, heart and endocrine system**. Individuals with thalassemia are susceptible to infections, heart problems, bone deformities and spleen enlargement (34). Haemoglobin structure is made of four chains based on which chain is deformed there are types of thalassemia such as alpha-thalassemia and beta-thalassemia. **60-80 million** people in the world carry beta thalassemia genetic trait. It is more prevalent in tropical countries. Medications involve iron chelation therapy or agents that bind to iron and enable its excretion (61). This is essential as multiple blood transfusions can cause iron overload, but they cause multiple side effects. People with moderate to severe disease require transfusions every 4 months, while in severe cases they may require at a frequency of 2-4 weeks. Bone marrow transplant and surgery are other treatment options. Though this disease can't be cured, science is exploring ways of making the condition manageable. Little research has been conducted on benefits of turmeric in thalassemia. Turmeric's bioactive ingredient is curcumin and other compounds related to curcumin found naturally in turmeric are curcuminoids. Curcumin and curcuminoids are excellent antioxidants. Antioxidants as well as iron chelators are found to be therapeutic in thalassemia (56). They help in getting rid of oxidative stress (imbalance between antioxidants and oxidants) and rid of excess iron.

5. Saffron; Saffron has long been used in traditional Persian medicine as a mood lifter, usually steeped into a medicinal tea or used to prepare rice. Research from Iran's Roozbeh Psychiatric Hospital at Tehran University of Medical Sciences has found that saffron may help to relieve symptoms of **Premenstrual Syndrome** (PMS) and depression. In one study, 75% of women with PMS who were given saffron capsules daily reported that their PMS symptoms (such as mood swings and depression) declined by at least half, compared with only 8 percent of women who didn't take saffron. Saffron. Potassium helps balance fluids in cells, which, if low, can cause painful muscle cramps (49). Beyond that, saffron contains more than **150 volatile compounds**, among others. Picrocrocin, for instance, is the main

substance responsible for the strong taste. Safranal brings saffron its characteristic odor and fragrance saffron. Saffron, the exotic golden spice, can do more than just add color and flavor to your dishes. It has been valued in traditional Asian medicine for its impressive health benefits (48). Modern science has also begun to recognize the power of saffron's bioactive compounds such as crocin, crocetin, picrocrocin, and safranal. Saffron can treat gastric disorders, lower depression, improve symptoms of premenstrual syndrome, reduce insulin resistance, and protect the heart. Saffron is royalty in the world of spices. This golden spice, derived from the dried stigma and style of the purple blue saffron flower. The health benefits of saffron are so significant that modern medical science has begun to pay attention. Most notably, saffron's bioactive compounds like crocin, crocetin, picrocrocin, and safranal have stolen the spotlight. Soothes an upset stomach traditionally, saffron has been used in Eastern medicine to treat gastric disorders (41). This means that it can help eliminate the burning pain, heartburn, and indigestion that comes with a stomach ulcer. Animal studies show that saffron extract and its active components crocin and safranal have antioxidant properties that reduce ulcer formation by preventing damage to the gastric mucosa (3). If you are prone to ulcers, a pinch of saffron may be just what the doctor ordered (2). Lowers depression is a common problem that impacts **19 million Americans** (4). And while there are countless pills to treat depression, saffron has emerged as an effective and natural alternative. One study determined that the power of saffron is comparable to the antidepressant imipramine for treating mild to moderate depression. Saffron seems to work its magic through crocin and safranal, both of which modulate the neurotransmitters dopamine, serotonin, and norepinephrine, the cocktail of brain chemicals that influence your mood (53). Improves PMS About 85% of menstruating women suffer from at least one PMS symptom during their monthly cycle(6). You might be surprised to learn that a remedy for PMS is sitting right on your spice rack. Research has found that saffron can significantly reduce the symptoms of PMS that impact mood, behavior, and pain. Saffron's ability to influence the neurotransmitter serotonin (74). Lowers Insulin resistance Insulin resistance a condition in which your cells stop responding normally to the hormone insulin is a leading factor in the development of diabetes. Crocetin, a major component of saffron, has been found to tackle insulin resistance. An animal study found that when rats were fed a high-fructose diet, they developed insulin resistance along with many other pathological changes. Amazingly enough, crocetin's antioxidative and anti-inflammatory properties alleviated their insulin insensitivity(8). And while it is always best to limit high-fructose foods, saffron may be able to help prevent the negative impact of the occasional soda and candy (5). Protects your heart Saffron can be a

real treat for your heart. It has antioxidant and anti-inflammatory properties that can promote healthy arteries. Animal studies have also shown that crocetin has the ability to lower cholesterol. In fact, according to some researchers, one of the reasons Mediterranean countries like Spain have low rates of cardiovascular diseases is due to their heavy use of saffron(9).Preserves your sight age-related macular degeneration (AMD) is the leading cause of blindness in the developed world(11). When AMD develops, light-sensitive cells in your retina start to break down over time. However, research has shown that saffron supplementation can result in long-term stable improvement in retinal function in those with AMD. The stars of the show are crocin and crocetin, which are thought to protect light sensitive cells from retinal stress. They even have the ability to regulate cell death(11).

6.Parsley; Inhibit breast cancer cell growth. University of Missouri scientists found that this herb can actually inhibit breast cancer cell growth, reported Holly Pevzner in the September/October 2011 issue of Eating Well Magazine. In the study, animals that were given apigenin, a compound abundant in parsley and in celery, boosted their resistance to developing cancerous tumors (54). Experts recommend adding a couple pinches of minced fresh parsley to your dishes daily. High Source of Flavonoid Antioxidants. provides beneficial essential oils that fight Cancer. Acts as natural diuretic and helps to relieve bloating. May help **fight Kidney stones**, Urinary Tract Infections and Gallbladder Infections. Has antibacterial and antifungal properties. The health benefits of parsley include controlling **cancer, diabetes, and rheumatoid arthritis**, along with helping prevent **osteoporosis**. Furthermore, it acts as a pain reliever with anti-inflammatory properties (55). It also provides relief from gastrointestinal issues such as indigestion, stomach cramps, bloating, and nausea, while helping strengthen the immune system. It is also a highly nutritious plant and has ample vitamins and antioxidants which can greatly improve our health. Parsley is an herb that originated in the mediterranean region of southern Italy, Algeria, and Tunisia. At first, it was used only as a medicinal plant, but later on, it was consumed as a food (48).

a. Parsley Nutritional Facts. The nutrients found in parsley include vitamin A, K, C, and E, thiamin, riboflavin, niacin, vitamin B6, vitamin B12, pantothenic acid, choline, folates, calcium, iron, magnesium, manganese, phosphorus, potassium, zinc, and copper. It is also a very good source of volatile compounds such as myristicin, limonene, eugenol, and alpha-thujene (58). Its leaves contain energy, carbohydrates, fats, and protein. Parsley, known for

its use as a garnish, has many nutrients that provide health benefits to people. Some of these benefits include:

b. Controls Diabetes. Traditionally, parsley was used as a medicine for diabetes in Turkey. In order to scientifically validate this claim, research was conducted at Marmara University in Istanbul, Turkey. The research showed evidence that diabetic rats that were given parsley actually showed a decrease in their blood sugar levels over a period of a month (56). The research indicates that it can be used for diabetic control.

c. Controls Rheumatoid Arthritis. Parsley has also been particularly effective against rheumatoid arthritis. Compounds such as vitamin C and beta-carotene found in the herb possess anti-inflammatory properties that help in controlling arthritis. Consuming it regularly is also believed to speed up the process of uric acid removal, which has been linked to symptoms of arthritis (36).

d. Anti-carcinogenic Properties. Zheng, Kenney, and Lam from LKT Laboratories in Minneapolis, Minnesota have extracted a compound named myristicin, which is a phenylpropane, from parsley oil extract. A preliminary investigation into myristicin revealed that it has anti-carcinogenic properties (43). Myristicin extract from the herb was only tested on rats and human application of this compound still remains to be seen.

f. Anti-inflammatory Properties. Parsley has traditionally been used in the Mediterranean region for toothaches, bruises, insect bites, and rough skin. According to preliminary studies conducted at the King Saud University by Al-Howiriny et al., parsley displays anti-inflammatory and anti-hepatotoxicity properties (40). The anti-inflammatory properties reduce internal inflammations, while the anti-hepatotoxic properties help cleanse the liver.

g. Treats Osteoporosis. Parsley is effective in cases of osteoporosis and is helpful in maintaining bone health. Osteoporosis occurs due to depleted levels of calcium in the bones and also due to lack of an amino acid called homocysteine (12). This amino acid can be broken down by the intake of folic acid. Due to this aspect, apart from dairy products and vegetables, parsley is regarded as one of the best sources of calcium. It also contains an appropriate amount of folic acid, which may break down homocysteine.

h. Diuretic Effects. For many centuries now, parsley has been used as a diuretic that helps in controlling various diseases such as kidney stones, urinary tract infections, and gallbladder

stones. Edema is a medical condition where a patient retains more fluid in the body than what he or she is supposed to hold under normal circumstances. The body swells because of fluid accumulation. If you are afflicted by this condition, a few teaspoons of parsley juice can provide some quick relief. The roots of the herb are also very useful in counteracting kidney stones (14). Adding its roots to boiling water and drinking it on a daily basis is also known to be effective as a general cleanser for the body.

i. Strengthens the Immune System. The vitamins, minerals, and antioxidants found in parsley are helpful for strengthening immunity. Vitamins such as vitamin C, A, K, folate, and niacin each act on different aspects of the immune system. Vitamin A acts directly on lymphocytes or white blood cells, thereby increasing their effect. The chlorophyll contained in it has anti-bacterial and anti-fungal properties as well (17). Studies have also shown that the herb contains antioxidant properties and antibacterial properties, making it an ideal source for various home remedies.

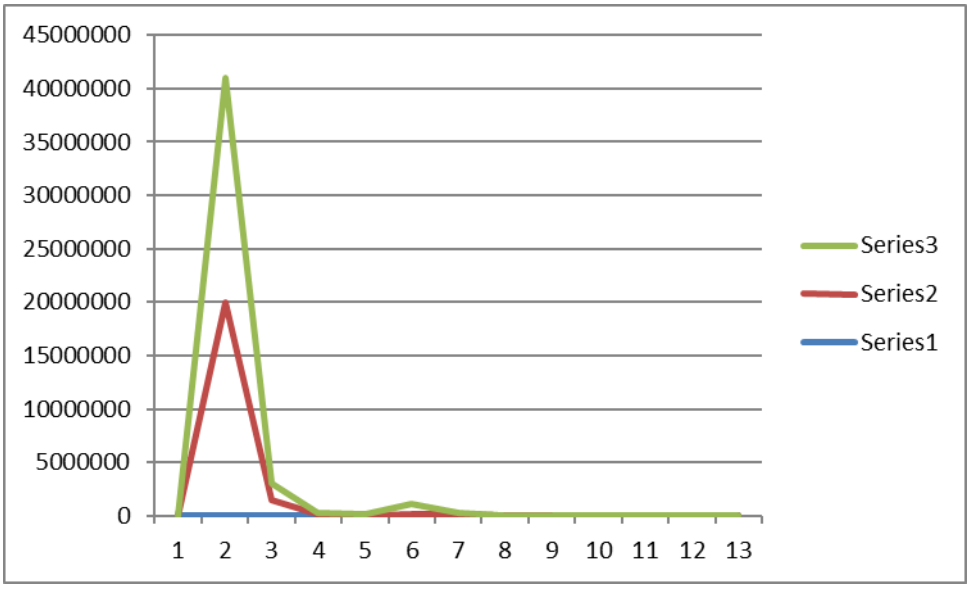
7. Sage; Sage is an excellent source of fiber, vitamin A, folate, calcium, iron, magnesium, manganese, and B vitamins such as folic acid, thiamin, pyridoxine, and riboflavin in much higher doses than the recommended daily requirements, plus healthy amounts of vitamin C, vitamin E, thiamin, and copper. The important health benefits of sage include its ability to improve brain function, lower inflammation, prevent chronic diseases, boost the immune system, regulate digestion, alleviate skin conditions, strengthen the bones, slow the onset of cognitive disorders, and prevent diabetes. This perennial woody herb is unbelievable when it comes to its impact on human health. Scientifically known as Salvia officinalis, sage is closely related to rosemary, and they are often considered “sister herbs”. In fact, many of sage’s health benefits are derived from the rosmarinic acid, the organic compound found in rosemary that makes it powerful (22). It does have its differences and is actually an evergreen shrub with woody stems and blue/purple flowers that are found in the Mediterranean region. The traditional use of sage in medicine is well-documented and goes back thousands of years. It was initially used for the treatment of snakebite, protecting against evil, boosting female fertility (23). However, modern research has discovered that the impact of sage on the human body can be considerable, which is why it is widely exported around the world and makes its way into recipes from the United States to the Middle East. Typically, it is added to savory dishes due to its peppery flavor and is a key ingredient in many meals and meat-based preparations.

8.Rosemary; The most interesting health benefits of rosemary include its ability to boost memory, improve mood, reduce inflammation, relieve pain, protect the immune system, stimulate circulation, detoxify the body, protect the body from bacterial infections, prevent premature aging, and heal skin conditions. Native to the Mediterranean region, rosemary is one of the most commonly found herbs in a spice rack, and for good reason not only does it have a wonderful taste and aroma, but also a wealth of beneficial health effects if regularly added to our diet. Uses of rosemary that involve consuming larger quantities or applying its essential oils to the skin directly. Health benefits of rosemary include (34). The anti-aging properties of rosemary are quite well known. Although more commonly thought of in its essential oil form, the leaves of rosemary can also affect the skin internally or topically and have been shown to improve the quality of the skin, while also healing blemishes and increasing the natural shine and hydrated appearance of your body's largest organ (23). The essential oil of rosemary is not to be consumed, but normal rosemary is far less potent, and therefore, not dangerous to consume in normal culinary proportions. If you are allergic to other members of the mint family, you may experience discomfort if you consume or apply it, but the reactions are typically mild. Rosemary is a popular herb that is perennial and native to the Mediterranean region. It is actually a member of the mint family, which may explain its very pleasant scent and popularity in certain cuisines around the world. It is also commonly used in natural healing practices, as rosmarinic oil and other active ingredients in this herb can be very helpful for a number of health issues. You can use it in your cooking as a garnish or final spice. You shouldn't cook with it, as this can cause some of the beneficial components in it to be lost (11). Topical application of rosemary that has been infused in oil is another popular use. Rosemary poultices and air fresheners are also widely used.

Fig.1. Common Spices and Herbs used in day to day life worldwide

Table 1. Top 10 Spice Producing Countries (in metric tons) Worldwide

Rank	Country	2017 metric tons	2018 metric tons	Highly Preferable
1	India	1,574,900	1,525,000	Rosemary, Ginger, Rosemary, Saffron, Turmeric, Garlic, Chile Peppers.
2	China	100,000	105,890	Ginger, Rosemary, Saffron, Turmeric, Chile-Peppers Garlic, sage.
3	Bangladesh	138,517	139,775	Rosemary, Ginger, Rosemary, sage.
4	Pakistan	55,647	55,620	Ginger, Rosemary, Saffron, Chile Peppers.
5	Iran	20,028	22,307	Rosemary, Ginger, Rosemary, Saffron.
6	Nepal	21,360	22,000	Rosemary, Saffron, Ginger, Rosemary.
7	Colombia	16,998	20,200	Ginger, Rosemary.
8	Turkey	107,000	12,200	Ginger, Rosemary, Garlic, Chile Peppers
9	Ethiopia	29,122	22,905	Ginger, Rosemary, Garlic.
10	Sri Lanka	8,293	9,800	Ginger, Rosemary, Garlic, sage.
11	World	1,996600	2,200600	Ginger, Chile-Peppers, Rosemary, Garlic.



Graph. 1. Top 10 Spice Producing Countries (in metric tons) Worldwide

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