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THE NUTRITIONAL POWERHOUSES HIDDEN IN BERRIES AND EMERGING TRENDS FOR REVOLUTIONIZING MEDICINE: A REVIEW

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ABSTRACT

“The Nutritional Powerhouses Hidden in Berries” delves into the extraordinary health benefits packed within these tiny fruits. Despite their diminutive size, berries boast an impressive array of vitamins, minerals and antioxidants, making them nutritional powerhouses. From the anthocyanin in blueberries to the vitamin C content of strawberries, each berry variety offers a unique blend of nutrients crucial for maintaining optimal health. Beyond their nutritional value, berries are also gaining recognition for their potential in revolutionizing medicine. Emerging trends suggest that the bioactive compounds found in berries could hold the key to addressing various health conditions, from cardiovascular disease to neurodegenerative disorders. Research is increasingly uncovering the medicinal properties of berries, highlighting their anti-inflammatory, anti-cancer, and neuroprotective effects. As science continues to unravel the mysteries of berries, innovative approaches are being explored to harness their therapeutic potential. From pharmaceutical formulations to functional foods and nutraceuticals, the applications of berry-derived compounds are expanding rapidly. These developments hold promise for the future of healthcare, offering natural solutions that complement conventional treatments and promote holistic well-being.

Key words : Berries, Anti-inflammatory, Therapeutic, Bioactive, Anti-cancer, Nutraceuticals.

Introduction

Spectacular gems of nature, berries have been fascinating people’s interest for many centuries. The vividly coloured and small fruits things come in various shapes, sizes and nutritional characteristics: from the tartness of cranberries to the sweetness of strawberries (Maria, 2018). While, these fruits have always been very delicious, the fruits have long been cherished for their nutritional value and significant health benefits. Berries are a rich source of vitamins, minerals, antioxidants and phytochemicals and they are considered to be superfoods that promote an individual’s overall well-being. From

ancient times, when the fruits were praised for their medicinal properties, to contemporary cooking and research, berries never fail to amaze and delight. In this introduction, we take the reader journey into the world of berries by discussing their history, diverse types and numerous benefits for health (Mareike Jezek, 2018).

When it comes to phenolic chemicals, berries are right up there with the best of them. While some of the phenolic chemicals (like anthocyanins) found in berries are common to many fruits and vegetables, others (like ellagitannins) are exclusive to certain berry species. The anthocyanins that give red berries, grapes, wine and a lot

other veggies their color are present in many foods that people eat (Jie Li, 2018). The anthocyanins were measured molecularly in 282 samples of strawberry and soft fruits cultivated in Trentino using HPLC-DAD and HPLC-DAD-ESI-MS methods. This was done to provide a comprehensive picture of their existence in the human diet. Anthocyanin content averaged 1962 mg/kg in blueberries, 1279 mg/kg in blackberries, 1022 mg/kg in blackberries, 367 mg/kg in strawberries, 313 mg/kg in raspberries, 198 mg/kg in wild strawberries, 78 mg/kg in gooseberries and 69 mg/kg in red currants. To ensure the fruit has the appropriate amount of anthocyanins, one must carefully choose the variety due to the highly high diversity within each species. We isolated and analyzed the ellagitannins from 21 raspberry and 15 blackberry varieties grown in Trentino. Ellagic acid, methyl-sanguisorbate, methylgallate and sanguisorbic acid are the main reaction products that can be quantified in this work, which details the use of a novel technique for acid hydrolysis of Rubusellagitannins in methanol. Blackberry samples ranged from 880.2 mg/kg to 3897.5 mg/kg, whereas fox raspberry samples ranged from 941.5 mg/kg to 1742.7 mg/kg in terms of total ellagitannins. Raspberry cultivars varied by a factor of two in their total ellagitannin concentration, whereas blackberry cultivars varied by a factor of four (Jie Li, Chunhua Yuan, 2017).

Acai berry

The spherical fruits known as acai berries are produced by acai palm trees that are native to the rainforests of Central and South America. They are classified as drupes rather than berries because they may be identified by their dark purple exterior and golden flesh that surrounds a huge seed. One may purchase them in the form of frozen fruit purée, dry powder, or pressed juice. They are often used as an accompaniment to main courses. Additionally, they have a flavor that is somewhat earthy, and it is sometimes compared to a combination of blackberries and chocolate that has not been sweetened.

As a result of their high fat content and low sugar content, acai berries have a distinctive nutritional profile. In most cases, an Oxygen Radical Absorbance Capacity (ORAC) score is used in order to determine the amount of antioxidants that are present in food. One hundred grams of frozen acai pulp has an ORAC of 15,405, which is much higher than the ORAC of blueberries, which is only 4,669 grams. Acai contains plant components, including anthocyanins, which are responsible for the antioxidant action of the fruit. Acai pulp, acai juice, applesauce, or a beverage that had no antioxidants was

administered to a group of twelve participants who were fasting at four separate periods in 2008. After that, the researchers examined the antioxidant levels in their blood. The antioxidant levels of the participants were increased by both the acai pulp and the applesauce, which points to the fact that the antioxidant chemicals found in acai are well-absorbed in the digestive tract. Studies conducted on animals have revealed that acai may be able to assist in the improvement of cholesterol levels by lowering both total and LDL cholesterol.

It has been shown that acai pulp may lower the risk of developing colon and bladder cancer in mice, however it did not have any impact on the development of stomach cancer. For the time being, researchers feel that acai may play a part in the treatment of cancer in the future; however, further study is required, including research on people. Acai berries contain a wide variety of plant components, which may also protect the brain from harm as you get older. The antioxidants included in acai fruit protect brain cells from the potentially harmful effects of inflammation and oxidation, both of which may have a detrimental impact on learning and memory formation. One research found that acai even helped boost memory in mice that were becoming older. Acai extract has been discovered to induce the “housekeeping” response in brain cells, which assists in the maintenance of healthy brain function by engaging in autophagy to eliminate cells that are toxic or that are no longer necessary for brain function.



Fig. 1 : Acai berry.

Strawberry

Strawberries, which belong to the rose family, are a fruit that is both edible and beneficial to one’s health. Over ten different species are known to exist, each with a unique taste, size, and texture, but they all have the same heart-shaped form and crimson seeded meat (Michelle, 2016). Strawberries are not fruits by any stretch of the imagination; rather, they are plants that carry their seeds on the outside and generate runners, which produce roots that make clone plants. Strawberries include a total of 136 milligrams of potassium, 49 micrograms of folate, 46 milligrams of vitamin C, 0.5 grams of protein, 0.4 grams

of fat, 4.9 grams of carbs, 13.0 grams of fiber, and a serving size of 80 grams (Joanna Kolniak-Ostek, 2015).

Strawberries have a number of health benefits, the most important of which are that they are low in calories, that they are beneficial to the health of the heart, that they help to manage blood pressure, that they regulate blood sugar, that they may be of assistance to people who have type 2 diabetes, that they protect against cancer, that they encourage weight management, that they help to alleviate joint pain, and that they support the health of the gut. The fact that they contain just 24 calories per serving (80 grams) makes them a nutritious alternative to sweets and fruit puddings (Navindra P. Seeram, 2014).

There are protective plant chemicals known as polyphenols that may be found in strawberries. These polyphenols include ellagic acid and ellagitannins, both of which have shown potential in the management of some symptoms associated with type 2 diabetes. There is a need for more study to help substantiate these effects in human subjects 9 (Shama V. Joseph, 2014).

Strawberry consumption may be beneficial for weight management in addition to the nutritional advantages they provide. Strawberries have a low glycemic index (GI), which means they might help control the release of blood sugar. The flavonoids found in strawberries have the potential to reduce the incidence of Alzheimer's disease in older persons by lowering inflammation in the brain and delaying the onset of memory loss that is associated with aging. Strawberries, in conclusion are a fantastic option for a diet that is balanced since they are a rich source of nutrients, including polyphenols and fibre, both of which have prebiotic qualities (Liladhar Paudel, Faith, 2014).



Fig. 2 : Strawberry.

Mulberry

Mulberries are the fruits that are produced by mulberry trees, which are historically cultivated in Asia and North America for the purpose of harvesting their leaves. They hold a variety of colourful berries, which

are often processed into beverages like as wine, fruit juice, tea, jam, or canned goods. However, as a snack, they may also be dried and consumed. Mulberries are gaining popularity all over the globe as a result of their deliciously sweet taste, remarkable nutritional content, and several other health advantages (Poorva Vyas, 2013).

One cup (140 grams) of fresh mulberries has just sixty calories and is composed of eighty-eight percent water. They have 9.8% carbohydrates, 1.7% fiber, 1.4% protein, and 0.4% fat in their composition. It is common practice to take mulberries in a dried form, much like raisins. Mulberries include 70% carbohydrates, 14% fiber, 12% protein, and 3% fat. Fresh mulberries include around 10% carbs, water, protein, carbohydrates, sugar, fiber, and fat in a serving size of 3.5 ounces. Other nutritional components include sugar, fiber and fat (Yuta Kurimoto, 2013).

Because of their high vitamin and mineral content, mulberries are especially abundant in vitamin C and iron. These vitamins are not only necessary for maintaining healthy skin but also for a variety of body processes. In addition, they include potassium as well as vitamins E and K. Additional plant chemicals, like as anthocyanin, are responsible for their vivid colour and the positive impact they have on one's health. Mulberries that are ripe and have a dark hue have a greater quantity of these chemicals than berries that are colourless (Aneta Wojdyło, 2013).

There are a number of chronic disorders that might potentially benefit from the consumption of mulberries or mulberry extracts. These conditions include cancer, diabetes, and obesity. With its ability to remove extra fat and lower cholesterol levels, mulberries provide a number of health advantages, one of which is a reduction in cholesterol levels. Furthermore, they have the potential to enhance blood sugar management by reducing the rate at which blood sugar levels rise after meals. Further, mulberries have been used in traditional Chinese medicine as a treatment for cancer (Melanie Josuttis, 2013). Some researchers now believe that the purported cancer-preventive benefits of mulberries may have a scientific foundation. Mulberries have been used in traditional Chinese medicine for centuries. Studies conducted on animals have shown that the antioxidants included in mulberry juice may reduce oxidative stress, which may in turn reduce the chance of developing cancer. On the other hand, the same holds true for fruits and vegetables in general, and there is no evidence to indicate that mulberries lower the risk of cancer more than other fruits or berries (Anna Szakiel, 2012).



Fig. 3 : Mulberry.

Blueberry

The official name for blueberries is *Vaccinium* and they are classified as “superfruits” owing to the high levels of polyphenolic compounds that they contain. Blueberries are members of the Ericaceae family. In accordance with the species to which they belong, they are known by a variety of common names, including high bush, low bush, rabbit eye, and European bilberry. It has been shown that blueberries may increase brain function and slow the cognitive loss that is associated with aging (Henry F. Rossi, 2012). It is possible that the substances they contain may assist in lowering blood pressure and lowering the chance of developing heart disease. The creation of collagen and the operation of the immune system are both significantly influenced by vitamin C, which may be found in abundance in blueberries (Luke R. Howard, 2012).

Blueberries have numerous beneficial properties, including acting as an antioxidant, anti-cancer activity, body weight maintenance ability, blood sugar-lowering effect, cholesterol-lowering effect, blood pressure maintaining activity, antibacterial activity, anti-inflammatory action, liver health, immunity enhancing effect, brain health and lung health. There are considerable levels of critical vitamins that may be found in a single cup of blueberries. These vitamins include 24 percent of the daily need for vitamin C, 5 percent of the daily requirement for vitamin B6, and 36 percent of the daily requirement for vitamin K (Navindra P. Seeram, 2012).

Blueberries have a high concentration of anthocyanin, a pigment that has been shown to possess antioxidant properties. This pigment may be advantageous in lowering oxidative stress and playing a significant part in the regulation of blood sugar levels. It is also possible that they will be useful in limiting the spread of cancer cells and promoting their death, so lowering the likelihood of cancer developing and the danger of cancer returning. According to the findings of a laboratory research, the lowbush type blueberry contains proanthocyanidins, which are antioxidants. These proanthocyanidins have the potential to destroy cancer cells in human colon cancer

cell lines, which makes it a crucial anti-cancer agent for colon cancer (Patricia Dobson, 2012).

In addition, blueberries may have the ability to defend against bladder infections. This is because blueberries contain chemicals that might prevent bacteria from attaching itself to the walls of the bladder, which could possibly reduce the likelihood of an infection occurring. The drinking of blueberry juice on a daily basis may be good for the treatment of degenerative disorders, the enhancement of memory, the improvement of blood flow to the brain in seniors who are otherwise healthy, and the delay of the destruction of brain cells.

Blueberries have the potential to improve eyesight, hence assisting in the restoration of visual acuity. Blueberry anthocyanins have the potential to improve eye health and minimize the risk of developing retinal disorders. When it comes to human health, however, further study is required to discover the exact degree of the advantages that blueberries provide (Anna Szakiel, 2012).

The usage of blueberries as a functional food has the ability to manage issues associated to inflammation and has been shown to have some advantages in terms of memory performance. On the other hand, further research is required to determine the full degree of the advantages that blueberries have on human health and to take into account the different responses that people have to blueberries specifically. It is essential to get the advice of a medical professional prior to utilizing blueberry preparations for any kind of medical issue (Barbara Kuszniereicz, 2012).



Fig. 4 : Blueberry.

Raspberry

Raspberries are a popular edible fruit that are native to Europe and northern Asia. There are many different sorts of raspberries, including black, purple, and golden varieties. *Rubusidaeus*, sometimes known as the red raspberry, is the most common kind and is cultivated in temperate regions all over the globe. It is advisable to consume these sweet and sour berries as soon as possible after acquiring them since they have a limited shelf life.

There are 64 calories, 14.7 grams of carbohydrates, 8 grams of fiber, 1.5 grams of protein, 0.8 grams of fat, 54% of the Reference Daily Intake (RDI), manganese, 12% of the RDI, 5% of the RDI for vitamin C, 5% of the

RDI for B vitamins, iron, magnesium, phosphorus, potassium, and copper in a single serving of raspberries. Raspberries are an abundant source of nutrients. In addition to that, they have trace levels of vitamin A, thiamine, riboflavin, vitamin B6, calcium, and zinc (JinZhi Wang Gad, 2012).

Raspberries have a high concentration of antioxidant substances, including vitamin C, quercetin and ellagic acid, which assist cells in defending themselves against oxidative stress and recovering from its effects. The antioxidant level of these berries is comparable to that of strawberries, but it is only half as high as that of blackberries and just a fifth of what blueberries have. Raspberries and raspberry extracts have been shown to have anti-inflammatory and antioxidative properties, according to research conducted on animals. These properties have the potential to lower the risk of developing chronic illnesses including cancer, diabetes, obesity, and heart disease (MarouaneBaslam, 2011).

Raspberries are an excellent source of fiber, vitamin C, and a variety of other vitamins and minerals that are necessary for living. The antioxidant qualities that they possess could be able to assist in lowering the risk of several chronic illnesses (MarouaneBaslam, 2011).

Raspberries are a fantastic alternative for those who are wanting to decrease the amount of carbohydrates they consume since they include a high concentration of fiber and tannins. There are just 6.7 grams of net digestible carbohydrates in one serving of raspberries, despite the fact that one cup of raspberries has 14.7 grams of carbohydrates and 8 grams of fiber overall. The majority of berries are classified as low-glycemic foods, which means that they are not likely to cause an increase in blood sugar levels. According to research, raspberries have the potential to reduce blood sugar levels and improve insulin resistance. Studies conducted on animals have shown that raspberries reduce blood sugar levels and show less symptoms of fatty liver disease (Ryo Furuuchi, 2011).

In addition, raspberries have a high concentration of tannins, which inhibit the activity of alpha-amylase, an enzyme that is essential for the digestion of starch. This may limit the influence that a meal has on blood sugar by reducing the amount of carbohydrates that are absorbed after a meal (Jodee L. Johnson, 2011).

The high quantities of antioxidants found in raspberries may provide some protection against cancer. Studies conducted in test tubes have shown that red raspberry extract has the ability to eliminate up to 90 percent of cancer cells found in the breast, colon, and stomach.

Sanguin H-6, an antioxidant that may be found in red raspberries, was also responsible for the death of more than forty percent of the cells that were discovered in ovarian cancer (Ali K.J. Koskela, 2010).

Additionally, there is the possibility that raspberries provide other health advantages, such as alleviating the symptoms of arthritis. Two studies found that rats who were given red raspberry extract had a decreased probability of developing arthritis compared to animals that were given a control group. Additionally, individuals who were administered raspberry extract saw reduced joint damage and edema compared to the group that served as the control (Shelly Hogan, 2010).

Raspberries are a low-calorie snack that are also high in fiber, making them a satisfying option for those who are trying to lose weight. Raspberries contain 8 grams of fiber. Your need for sweets could be somewhat satiated by their inherent sweetness. It's possible that the chemical compounds that are naturally present in raspberries may also help you lose weight. According to the findings of one research, mice who were given either a high-fat diet, a low-fat diet, or a high-fat diet supplemented with one of eight berries, including raspberries, gained less weight than mice that were simply given a high-fat diet (Maria Elisa Schreckinger, 2010).

In addition, raspberries have a significant amount of vitamin C, which is essential for maintaining healthy skin. The creation of collagen may be improved, and the damage to the skin caused by ultraviolet radiation may be reversed. Aged rats, who were given a diet consisting of either 1% or 2% raspberries exhibited improvements in their motor capabilities, including their balance and strength, in a trial that lasted for eight weeks (Antonietta Ruiz, 2010).



Fig. 5 : Raspberry.

Cranberry

Cranberries, which are indigenous to North America, are considered a superfood due to their strong anti-oxidant and vitamin content. Cranberries include a number of minerals that have been related to a number of health benefits, including a reduced risk of urinary tract infections (UTIs), improvements in immunological function, a

reduction in blood pressure, and the prevention of some forms of cancer. According to the Dietary Guidelines for Americans 2020–2025, it is recommended that individuals have a diet that boasts an abundance of fruits and vegetables. Cranberries have a long history of usage as a therapy for a variety of ailments, including those affecting the kidneys and bladder. Cranberries are an excellent source of a wide range of vitamins and antioxidants (Navindra P. Seeram, 2008).

The management of urinary tract infections (UTIs), the reduction of the risk of cardiovascular disease and the improvement of dental health are all possible advantages of cranberries. A systematic analysis conducted in 2019 discovered that include cranberries in one's diet may be beneficial in the management of various risk factors for cardiovascular disease (CVD). These risk factors include systolic blood pressure, a reduction in body mass index (BMI) and an improvement in high-density lipoprotein (HDL) levels. Additionally, a person's ability to regulate their blood sugar, chemical indicators of inflammation and elevated levels of HDL lipoprotein were all enhanced by eating a single dosage of a low-calorie cranberry beverage that included a high concentration of plant components on a daily basis (Natalia García-Manríquez, 2024).

Cranberries also have a number of favourable effects on cancer cells that are grown in test tubes. These benefits include causing cancer cells to die, lowering inflammation, and delaying the development of cancer cells. These results indicate that there is potential for the management of some tumours in the future alongside conventional therapies. Cranberries may also be helpful in avoiding gum disease, according to some research (Pergolotti, 2024).

Another advantage of cranberries is that they are nutritious. Cranberries that have been chopped contain 25 calories, 0.25 grams of protein, 0.07 grams of fat, 6.6 grams of carbohydrates, 2 grams of fiber, 4.4 milligrams of calcium, 0.12 mg of iron, 3.3 mg of magnesium, 6 mg of phosphorus, 44 mg of potassium, 1.1 mg of sodium, 0.05 mg of zinc, 7.7 mg of vitamin C, 0.5 micrograms (mcg) of folate DFE, 35 international units (iu) of vitamin A, 0.72 mg of vitamin E, and 2.75 mcg of vitamin K. Cranberries are a great source of nutrients. Additionally, they are a source of a variety of essential B vitamins, including as vitamin B-1 (thiamine), vitamin B-2 (riboflavin), vitamin B-3 (niacin), and vitamin B-6 (Piyush Verma, 2024).

Additionally, cranberries are an excellent source of vitamin C, which has the ability to prevent some of the

damage that is produced by free radicals that are responsible for illness, enhance the body's ability to absorb iron from plant sources, strengthen the immune system, and promote the formation of collagen for the purpose of wound healing. The consumption of a greater quantity of fiber has the potential to lessen the likelihood of acquiring a number of different health disorders, including but not limited to stroke, coronary heart disease, hypertension, high cholesterol, diabetes, obesity and some gastrointestinal diseases. Vitamin E, which is a fat-soluble antioxidant, is involved in the functioning of the immune system and has the potential to help prevent or postpone the onset of chronic illnesses that are connected with free radicals (Boya Cui, 2023).



Fig. 6 : Cranberry.

Gooseberry

Gooseberries are small, healthy foods that can help lower blood sugar, cholesterol, and blood pressure, among other things. Every gooseberry is about 0.1 to 0.2 ounces and can be green, yellow-white, pink, red, or dark purple. They have a range of tastes, from sour to sweet.

Gooseberries are very healthy. They are low in fat and calories but high in important nutrients. Gooseberries have 66 calories, 1 gram of protein, 15 grams of carbs, 7 grams of fiber, which is 46% of the Daily Value (DV) (Agnieszka Kopystecka, 2023). They also have 9% of the DV, 7% of the DV, 12% of the DV, 9% of the DV, 6% of the DV and 6% of the DV. Vitamin B5 is needed to make fatty acids and change food into energy, and vitamin C is a powerful antioxidant that is important for the skin, brain system and immune system. Copper is important for the brain, heart, blood vessels and immune system. Manganese helps with metabolism, bone growth, fertility and the immune system. Potassium is necessary for cells to work properly (Natalia Adamczuk, 2023).

Gooseberries are a healthy, low-calorie snack that provides about 3% of the daily caloric needs of a typical person. They also have a lot of soluble and insoluble fiber, which helps keep blood sugar levels in check, lowers blood pressure and cholesterol, and raises the risk of long-term diseases like heart disease, some cancers, type 2 diabetes and obesity.

Antioxidants are chemicals that help fight free radicals. Free radicals are unstable molecules that hurt cells and cause oxidative stress (María Isabel Curti, 2023). These are linked to a lot of diseases and getting old faster than you should. Gooseberries are a great way to get phytonutrients, antioxidants, and vitamin C. They also have small amounts of vitamin E. There are flavonols, anthocyanin, aromatic acids, and organic acids in gooseberries, among other phytonutrients. These chemicals may help keep your heart healthy, your mind sharp, your old body healthy, and they may even lower your risk of some cancers (Audrone Ispiryan, 2023).

Also, gourds may help keep blood sugar levels in check by slowing the rate at which sugar enters the system. This keeps blood sugar levels from rising too quickly. Studies in test tubes show that gooseberry extract stops alpha-glucosidase enzymes from moving sugar from the gut to the bloodstream. This happens by attaching to specific enzymes in the small intestine. Gooseberries also have chlorogenic acid, which may slow down the intake of carbs and help lower blood sugar levels after eating foods high in carbs (Zaixiao Tao, 2023).

The 11–14 mg of citric acid in 100 mg of gooseberries may also help protect against illnesses that damage brain cells over time. People who regularly eat foods high in citric acid are less likely to get diseases like Alzheimer's and stroke because it stops cells from storing iron. People also think that the vitamins and phytonutrients in gooseberries can help with brain diseases that come with getting older and lower the risk of stroke (Dario Donno, 2023).

Some kinds of cancer are also less likely to happen in people who eat a lot of berries, vitamins and antioxidants. Folate, flavonoid chemicals, and vitamins C and E are some of the things in gooseberries that are known to fight cancer. It is thought that these nutrients can lessen, fight, and fix damage caused by oxidative stress and inflammation, both of which can cause cancer. For instance, studies in test tubes and on animals show that anthocyanins stop cancer cells from growing and may lower the risk of getting some types of cancer, like colon, liver and breast cancer (Lúcia S. Boeira, 2023). But more study is needed to find out if gooseberries can help with cancer. The phytonutrients, antioxidants, and antioxidants in gooseberries are very high. These can help protect against fat, heart disease, type 2 diabetes and some kinds of cancer.

Antioxidants and potassium are just two of the many nutrients in gooseberries that are good for your heart. Oxidation of LDL cholesterol raises the chance of heart

disease, but these vitamins stop it. Also, antioxidants like flavonols and anthocyanins help lower blood pressure and make blood vessels work better, which may lower the risk of heart disease. Potassium is important for keeping blood vessels healthy and for keeping blood pressure and heartbeat normal. It is also linked to a lower risk of heart disease and stroke (Basant Singh, 2023). Gooseberries taste best when eaten raw, and their taste ranges from sour to sweet. To make, wash and cut up the berries, making sure to chop off the very bottom to avoid a woody taste. As a healthy snack, gooseberries are great. They can also be added to a fruit salad, put on top of rice or yogurt, or mixed into a fresh summer salad. You can also use them in baked or cooked foods, but keep in mind that the sugar in these foods can kill the vitamins and good phyto nutrients (Huma Bader Ul Ain, 2022).



Fig. 7 : Gooseberry.

Goji berry

Goji berries, which are also called *Lycium barbarum*, are from Asia and have been used as a food addition and medicine for more than 2,000 years. They were just recently brought to the rest of the world with promises that they could be good for your health in many ways. Goji berries are thought to keep your eyes healthy by having a lot of healthy vitamins, especially zeaxanthin (Fatemeh Mehdizadeh, 2022). Not only that, but these antioxidants can also protect against damage from free radicals, UV light and oxidative stress. Studies have shown that adults who drank goji berry juice for 90 days had much higher amounts of zeaxanthin and other antioxidants. Goji berries have healthy antioxidants and vitamins A and C, which are important for keeping you healthy and avoiding getting sick. Cancer cells are killed by having a lot of antioxidants in the body, such as vitamin C, zeaxanthin, and carotenoids (Shahmshad Ahmed Khan, 2022). A study on mice found that goji berries may stop tumors from growing and make cancer treatments work better. Beta-carotene, an important plant phytochemical known for helping skin stay healthy, is found in goji berries.

One study showed that giving mice 5 percent goji juice gave them enough antioxidants to protect their skin from UV damage and skin problems. Goji berries may help keep blood sugar levels stable by keeping insulin and glucose levels in check. Higher HDL levels have also been found in people with type 2 diabetes who eat goji berries. HDL is the good cholesterol. Goji nuts may help you feel better and sleep better. In 2016, it was found that goji berries can help people who are depressed or acting anxious (Bo Wang, 2022).

In the US, another study found that drinking goji berry juice could make you feel better, give you more energy, and boost your gut health. Adults who were healthy drank 120 milliliters of goji berry juice or a fake drink every day for 14 days. By day 15, the people who were given goji berry juice said they had more energy, were able to concentrate better, were smarter, had more mental clarity, and felt calmer and happier. Goji berries have been used in traditional Chinese medicine to treat liver cancer and keep the liver from getting hurt (Xinyao Xie, 2022).



Fig. 8 : Goji berry.

Conclusion

In summary, the study of berries reveals a wealth of fascinating information, including their extensive historical background and significant health advantages. Berries have long been valued for their therapeutic qualities and culinary adaptability, being ingrained in many civilizations all over the globe. The many ways that berries improve our health are still being discovered by science today; these benefits range from strengthening immunity to enhancing heart health and beyond. We are reminded of nature's infinite gifts and the significance of include these nutrient-dense powerhouses in our diets as we explore the complex world of berries. Berries are a testimony to the balance between flavour and health, whether they are consumed fresh, frozen, or dried. Knowing that we are nourishing our body and mind with every mouthful, let us enjoy the sweetness of strawberries, the tanginess of raspberries and the earthy richness of blueberries. Let us take with us a fresh appreciation for the humble but powerful berries that adorn our tables and provide flavour to our lives as we say goodbye to this excursion.

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