Int.J.Curr.Microbiol.App.Sci (2024) *13*(07): 106-132

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 13 Number 7 (2024)**
Journal homepage: http://www.ijcmas.com

Review Article

https://doi.org/10.20546/ijcmas.2024.1307.013

Health and Nutritional Benefits Provided by Superfoods: A Review

Jyoti Rani*, Sakshi Saini and Hitashi Jain

School of Allied Health Science, Jaipur National University, Jaipur- 302017, Rajasthan, India

**Corresponding author*

Keywords

Super food, Health benefit, Antioxidant, Bioactive components, Therapeutic benefit

Article Info

Received:
25 May 2024
Accepted:
28 June 2024
Available Online:
10 July 2024

A B S T R A C T

Superfoods, defined as foods of high nutritional and biological value with adequate bioavailability and bioactivity within the body due to extraordinary concentrations of nutrients and bioactive ingredients, can play an important role in a global arena where the identification of healthier and cleaner nutrient sources is practically mandatory. Superfoods are particular kinds of foods capable of demonstrating different positive benefits involving the avoidance of different ailments, providing impetus to the immune system, and important macro- and micro-nutrients in adequate quantities. These are currently garnering a lot of attention as customers become more health concerned. In contrast to their great health or even therapeutic benefits, which stem from their lengthy history of use, the concept of superfoods remains poorly understood. Superfoods, or more specifically superfruits, are often composed of exotic fruits that are not well known around the world. Many superfoods claim a wide range of different health benefits, including the effective activity of anti-oxidants; the presence of an extraordinary amount of bioactive components such as anthocyanins, flavonoids, phenolics, etc.; and/or potential impact on disorders such as cardiovascular diseases, diabetes mellitus, etc., typically by effecting specific markers such as blood pressure, body mass index, or waist circumference, and fasting. This review offers light on the nutritional composition of some important superfoods, as well as their potential role in the prevention of many chronic diseases. This manuscript could help consumers incorporate superfoods into their diets more frequently and successfully.

Introduction

Food not only relieves hunger and provides nutrients but also promotes health by preventing nutrition-related diseases and improving physical and mental well-being.

This approach aligns with Hippocrates' famous adage, "Let food be thy medicine, and medicine be thy food" (Šamec *et al.,* 2019). The need for nutritional remedies has made the "superfoods" more well-known in recent years as a viable remedy. Superfoods' unique health claims are making them a popular diet trend around the world (Ríos *et al.,* 2022).

The concept of "superfood" emerged in the 1990s, with a shared conviction in its better nutritional value compared to other food types.

In 1992, the Wall Street Journal published a story titled "Report aims to whet the palate for super food," which

introduced the term "superfood" (Singh *et al.,* 2022). According to the Harvard School of Public Health, the term "superfood" started out in conjunction with an advertising campaign by the United Fruit Company (the corporate forerunner of Chiquita Brands International) to encourage consumers to eat more bananas (Miller and Buiten, 2022).

The oxford dictionary defines a superfood as " a nutrient rich food considered to be especially beneficial for health and well-being." (Miller and Buiten, 2022).

Superfoods are plant-based foods that are nutritionally dense and provide maximum nutritional value for the fewest calories (Jagdale *et al.,* 2021).

These are recognised for their beneficial chemical composition with a high concentration of nutrients such as vitamins, minerals, and antioxidants, which are considered more than basic nutrition (Lucas *et al.,* 2021).

It can be considered an umbrella word for the description of foods that, in addition to their regular nutritional content, provide health benefits and/or disease prevention capabilities (Jagdale *et al.,* 2021). Historical use and light processing distinguish superfoods from functional foods.

Superfoods specifically emphasise their historical and cultural usage, setting them apart as traditional sources of increased health advantages, even though both offer health benefits beyond basic nutrition.

Additionally, it has been suggested that superfoods be categorised as both meals and medicinal plants because they offer "an abundance of synergistic elements" (Caba, 2019).

Nutritional attribute of Super food

Superfoods have remarkable nutritional characteristics, providing a diverse range of vitamins and minerals required for general wellness. They are high in antioxidants like polyphenols and flavonoids, which help fight oxidative stress and reduce inflammation.

Superfoods are high in dietary fiber, which promotes digestive health and helps manage blood sugar levels. Furthermore, many superfoods contain healthy fats including omega-3 fatty acids and monounsaturated fats, which promote cardiovascular and cognitive health. Their nutritious density, paired with low calorie content, makes them perfect for weight management and energy balancing.

Vitamins and Minerals

Vitamins and minerals are essential micronutrients that cannot be synthesized sufficiently or at all in humans, necessitating their intake through diet. Their absence in the diet causes deficiency illnesses (Godswill *et al.,* 2020).

There are two classes of vitamins: fat-soluble (A, D, E, K) and water-soluble (C and the B vitamins: B1, B2, B3, B5, B6, B12, biotin, folate).

Essential electrolytes for health include calcium, phosphorus, potassium, sodium, chloride, magnesium, iron, zinc, iodine, sulfur, cobalt, copper, fluoride, manganese, and selenium (Hoque *et al.,* 2023).

Vitamins and minerals have numerous health benefits including tissue maintenance, bone and teeth formation and health, serving as cofactors and coenzymes to enzyme various enzyme systems, aiding the regulation and coordination of most body functions, and other biochemical and physiological functions in the body (Godswill *et al.,* 2020).

Fats

Fats hydrolyze into fatty acids and glycerol. Fatty acids include saturated (e.g., lauric, palmitic, stearic) and unsaturated types: monounsaturated (e.g., oleic) and polyunsaturated (e.g., linoleic, alpha-linolenic) acids. Linoleic acid is an essential fatty acid derived only from food, serving as a precursor for other essential fatty acids (Kumar *et al.,* 2017).

Superfoods like salmon, sardines, nuts (almonds, walnuts), and seeds (chia, flaxseeds, pumpkin seeds) contain beneficial fats like omega-3 and omega-6 fatty acids, supporting heart health and cognitive function (Wolfe, 2009).

Dietary fibers

Dietary fibers retain water, keeping stools soft, bulky, and easily passed, which helps prevent constipation (Kumar *et al.,* 2017). Superfoods high in fiber support digestive health, stabilize blood sugar, and aid weight

control by increasing satiety, such as millet, barley, rye, quinoa, oats, etc. (Wolfe, 2009).

Micronutrients are essential elements required by human in amounts generally below 100 milligrams per day, while macronutrients are required in gram amounts daily.

Antioxidants

Antioxidants are vital compounds that play a crucial role in protecting the body from oxidative stress and damage caused by free radicals (ROS) like Superoxide (O_2^-), Hydrogen Peroxide (H_2O_2), etc. which are unstable molecules that can harm cells, proteins, and DNA (Halliwell & Gutteridge, 2007).

This damage has been related to aging and chronic illnesses including cardiovascular diseases, cancer, and neurological disorders. Antioxidant-rich superfoods include berries, nuts, seeds, and colorful fruits and vegetables like carrots, spinach, oranges, apples, etc.

These foods include phenolic substances with natural antioxidant properties and can reduce oxidation when incorporated into the diet. These phenolic components act like bioactive compounds called phytochemicals. Polyphenols are divided into two groups: phenolics and flavonoids. Flavonoids, including flavonols, flavones, flavanols, flavanones, anthocyanidins, and isoflavones, constitute most phenolic chemicals (Galanakis, 2019).

Vitamins like Vitamin C, E, and beta-carotene also act as natural antioxidants (Herring, 2007), which stabilize free radicals, play anti-inflammatory, and antimutagenic properties, and boost immunological function (Pokorny *et al.,* 2001).

Incorporating antioxidant-rich superfoods into your diet improves the body ability to battle oxidative stress and reduces the risk of chronic illnesses, emphasizing their value in improving overall health and longevity.

Health benefit of Super foods

Cardiovascular health

Cardiovascular disease (CVD) refers to a variety of disorders affecting the heart and blood arteries, including coronary artery disease, heart attacks, strokes, and hypertension. It is a leading cause of mortality globally, mostly caused by factors such as poor diet, lack of exercise, smoking, and genetic predisposition.

All health benefits of Super Foods is shown in the Fig 1. Tomatoes have been demonstrated to lower blood pressure.

A study investigated the effects of tomato extract, rich in antioxidants like lycopene, beta-carotene, and vitamin E, on blood pressure in patients with grade 1 hypertension.

The results suggest that short-term treatment with this antioxidant-rich tomato extract can lower blood pressure in patients new to drug therapy for hypertension (Engelhard *et al.,* 2006).

Research has indicated that flax seeds can enhance cardiovascular health. The study suggests that higher doses and longer durations of flaxseed intake may enhance these effects.

Overall, incorporating flaxseed into the diet of hypertensive patients for 12 weeks was found to be effective in lowering blood pressure, reducing total cholesterol levels, and managing BMI (Toulabi *et al.,* 2022).

Anti-inflammatory Properties

Anti-inflammatory superfoods have an important role in lowering chronic inflammation, which has been related to a variety of health conditions including heart disease, arthritis, and cancer.

Compounds like curcumin in turmeric and gingerol in ginger are well-known for their powerful anti-inflammatory properties.

These chemicals assist to suppress inflammatory pathways in the body, lowering the synthesis of pro-inflammatory molecules.

Berries have been shown to reduce inflammation in trials conducted on animals. Researchers administered extracts from blueberries and goji berries to forty mice over a period of ten days.

They assessed the impact on lipid peroxidation using the TBARS assay, as well as evaluating antioxidant capacity, reducing power, and anti-inflammatory activity. Phytochemical analysis included conducting assays such

as DPPH (2,2-diphenyl-1-picrylhydrazyl), measuring glutathione (GSH) levels, and examining catalase activity.

The results suggest that these berry extracts' constituents, including as quercetin, rutin, and other phenolics, may modulate oxidative stress in a paw edoema model, thereby eliciting an anti-inflammatory response (Nardi *et al.,* 2016).

Animal studies have linked the polyphenol portion of flax seeds to anti-inflammatory properties. Rats treated with the Polyphenol fraction of flax seed (PFF) for at least a week showed varying degrees of inhibition: a 29 percent inhibition rate at a dosage of 25 mg/kg body weight, a 40percent inhibition at 50 mg/kg body weight, and a 34 percent inhibition comparable to diclofenac.

These studies illustrated the anti-inflammatory effects of PFF. The standardized method for studying acute inflammation involved carrageenan, a substance known to induce the production of inflammatory mediators (Mechchate *et al.,* 2021).

Antioxidant effects

Antioxidants are substances that protect cells from free radical damage, which can result in oxidative stress and chronic illnesses.

Vitamin C and E, beta-carotene, and selenium are examples of common antioxidants, as are phytochemicals such as flavonoids and polyphenols found in fruits, vegetables, nuts, and seeds.

Clinical studies have indicated a correlation between spinach consumption and its antioxidant benefits among the general population. In a study involving 48 healthy men and women, participants consumed 20 grams of spinach daily for three weeks.

The spinach was consumed in whole-leaf, minced, or liquefied forms (via enzymatic digestion), resulting in increased plasma levels of lutein.

Lutein, found in spinach, acts by scavenging superoxide and hydroxyl radicals and stimulating the activity of antioxidant enzymes such as catalase, superoxide dismutase, and glutathione reductase, as well as increasing glutathione levels.

This may offer protection against oxidants in the blood. Furthermore, the study noted an increase in erythrocyte glutathione reductase activity compared to the control group that did not consume spinach (Roberts and Moreau, 2016).

Immune system

Superfoods are important in boosting the immune system because they include a wide range of critical nutrients and bioactive substances.

High quantities of vitamins C and E, which are often present in fruits such as citrus and berries, improve immune function by promoting white blood cell formation and activity.

Foods like green tea and dark chocolate contain antioxidants such as flavonoids and polyphenols, which help protect immune cells from oxidative damage.

The effects of red and green bell peppers on the generation of antibodies in mouse splenic B cells in culture. Red Bell Pepper Extract (RBPE) at doses of 0.375, 0.75, 1.5, and 2.25 mg/mL significantly increased IgM and IgG antibody production in vitro.

The highest IgM production was at 1.5 mg/mL, three times higher than untreated cells. RBPE also enhanced IgG antibody production. In contrast, Green Bell Pepper Extract (GBPE) did not stimulate B cells, resulting in no IgM or IgG antibody production.

This suggests that consuming Red Bell Pepper extract or its vegetables may strengthen humoral immune responses (Sarker, 2021). Studies conducted in clinical settings have shown a connection between eating mushrooms and boosting immunity.

In a 4-week study involving 52 healthy adults aged 21-41 years, participants consumed either 5 or 10 g of mushrooms daily. Eating shiitake mushroom increased ex vivo proliferation of γδ-T cells (60% more) and NK-T cells (2-fold more), with enhanced activation receptor expression suggesting improved cell function.

Increased IgA levels indicated enhanced gut immunity, while decreased CRP levels suggested reduced inflammation. Regular shiitake mushroom consumption improved overall immunity through enhanced cell activity and IgA production (Dai *et al.,* 2015).

Weight Management

Superfoods can be highly effective for weight management due to their nutrient density and low calorie content. Because of its high nutrient richness and low calorie content, superfoods can be quite beneficial for weight loss. They are often high in dietary fiber, which increases satiety and aids appetite management by keeping you satisfied for longer. Many superfoods, such as leafy greens and berries, have a low glycemic index, which helps to regulate blood sugar and reduce overeating. Millets are proven to help in weight management. In a randomized trial conducted at a tertiary care center, participants aged 30 to 70 years were screened based on specific criteria.

The study found that the BMI of the intervention group decreased significantly from 30.8 ± 3.7 to 29.8 ± 3.4, whereas the control group showed minimal change. Fasting and postprandial blood glucose levels also decreased after the intervention. However, there was no notable decrease in HbA1c values. Triglyceride levels decreased significantly, and there was a slight reduction in lipid profiles.

These results indicate that millets contribute to weight reduction (Anushia *et al.,* 2019). A link has been found between consuming chia seeds and their anti-adipogenic effects in clinical settings. The study found that chia seed digested proteins (DP), given with a high-fat diet to mice, significantly reduced cholesterol, triglycerides, body fat, and waist size. DP also lowered adipose inflammation markers and increased adiponectin expression without affecting LPL or HDL levels. Peptides from DP showed potential anti-inflammatory and anti-adipogenic effects by interacting with metalloproteinase-2 (Grancieri *et al.,* 2022).

Cognitive Function

Super Foods can considerably improve cognitive performance due to their high concentration of critical nutrients and bioactive substances. For example, omega-3 fatty acids found in fish, chia seeds, and flaxseeds promote brain function by increasing neuron transmission and lowering inflammation. Studies conducted in clinical settings have demonstrated that okra consumption can reverse cognitive defects. The study aimed to investigate whether okra extract and its components (quercetin and rutin) could protect neuronal function and improve learning and memory deficits in mice treated with dexamethasone. Learning and memory were assessed using the Morris water maze test. Pretreatment with okra extract, quercetin, or rutin restored BrdU-immunoreactivity in the dentate gyrus, indicating reversal of cognitive deficits and protection against morphological changes in the CA3 region in dexamethasone-treated mice (Tongjaroenbuangam *et al.,* 2011).

Sulforaphane (SFN), an isothiocyanate derived from broccoli, is a potent activator of the transcription factor Nrf2, which plays a central role in the inducible expressions of many cytoprotective genes. It has been reported that supplementation with SFN-rich broccoli sprout extract for 8 weeks effectively treated cognitive impairment in medicated patients with schizophrenia, although it did not alter other scores such as psychotic symptoms.

Additionally, a recent randomized, double-blinded, placebo-controlled study showed that treatment with SFN-rich broccoli sprout extract significantly enhanced social interaction, reduced abnormal behavior, and improved verbal communication in young men with autism spectrum disorder (Shirai *et al.,* 2015).

Bone health

Superfoods are important for bone health because they contain a high concentration of critical nutrients. Leafy greens, such as kale and spinach, are rich in calcium and vitamin K, which are essential for bone mineralization and strength.

Finger millet provides three times more calcium than milk and is the only cereal with stable calcium content. Thus, finger millet has the ability to correct calcium deficiencies organically (Anitha *et al.,* 2021).

The study reported that women with osteoporosis in Israel had significantly increased bone mineral density with a daily magnesium supplement of 250 mg compared to a control group that did not take magnesium supplements, while noting that dietary sources of magnesium include almonds, cashews, and peanuts (Price *et al.,* 2012).

Gut health

Superfoods can improve gut health greatly due to their high fiber content, which encourages regular bowel

motions and a healthy digestive tract. Foods high in prebiotics, such as bananas, garlic, and onions, support beneficial gut flora, promoting a balanced microbiome.

Studies have shown that Soy Bowman-Birk inhibitors (BBI) can prevent inflammation and the formation of cancer in the gastrointestinal tract. It was observed that in ulcerative colitis patients, a soy BBI-enriched extract demonstrated potential advantages over a placebo after 12 weeks.

It was also noted that BBI inhibits proteases, specifically targeting cellular serine proteases in the early stages of colorectal carcinogenesis. The therapeutic targets and mode of action of BBI as an anti-carcinogenic compound have been scientifically proven (Clemente and Olias, 2017).

In a clinical trial involving constipated and healthy adults, it was found that consuming two kiwifruits (*Actinidia callosa*) per day for four weeks led to a significant reduction in total colonic transit time compared to baseline in the constipated group.

However, in the healthy group, any difference in transit time was only noted in the sigmoid-rectal segment. It was observed among IBS-C patients that bowel movement frequency increased and stool transit time decreased (Katsirma *et al.,* 2021).

Anti-cancer Effects

Superfoods are thought to have anticancer properties due to their high concentration of bioactive substances that can help prevent or inhibit the growth of cancer cells.

Sulforaphane, a chemical found in cruciferous vegetables such as broccoli and Brussels sprouts, has been shown to improve detoxification processes and lower the risk of cancer.

Berries, high in antioxidants like ellagic acid, may protect cells from harm and limit cancer cell development. Studies have established a link between cucumber and its potential effects in cancer.

It has been noted that *Holothuria leucospilota* a tropical edible sea cucumber species, provides a readily available source of raw materials for the development of novel marine anti-cancer drugs. The results also indicated that *H. leucospilota* protein demonstrated excellent performance in inhibiting cell migration. It was concluded that *H. leucospilota* protein targets cancer cell cycles and induces cancer cell apoptosis.

Moreover, its superior ability to inhibit cancer cell migration compared to Epirubicin hydrochloride (EPI), a commonly used anti-tumor drug for treating solid tumors, suggests its potential as a promising anti-cancer drug (Ru *et al.,* 2022).

Incorporating Superfood into Diet

Including millets in your diet offers numerous health benefits due to their rich nutritional profile and versatility. While they can be consumed raw in salads or sprouted for added nutrition, cooking certain varieties enhances taste and digestibility.

Millet-based snacks provide a healthier option over processed snacks, offering sustained energy from complex carbohydrates and fiber. Additionally, incorporating minimally processed forms like millet flour or flakes into meals ensures you retain their nutritional value (Mehta and Taterway, 2024).

Including superfoods in your diet may be both easy and pleasurable. Start your day with a nutrient-dense smoothie including bananas, chia seeds, or berries. These vitamins, minerals, and antioxidants supplement your morning regimen.

Add quinoa, almonds, seeds, or avocado to your salads to boost protein, fiber, and healthy fats. To keep your energy levels consistent and fulfill cravings, eat a handful of nuts, seeds, or a piece of dark chocolate.

Breakfast can be an adequate dish of oats topped with berries, almonds, or flax seeds, which provide fiber, vitamins, and omega-3 fatty acids. When cooking, utilize superfoods like sesame seeds and peanuts to give your dishes potent anti-inflammatory and antioxidant effects.

Finally, indulge your sweet taste with sweets containing superfoods such as berries, or coconut, ensuring you get a nutritious boost even from your pleasures.

Making these modest, conscious modifications allows you to effortlessly incorporate superfoods into your regular diet, improving your overall health and well-being without compromising flavor or convenience (Wolfe, 2009).

Table.1 Different types of superfoods, active ingredient and medicinal use

Food group	Super food name	Botanical name	Active ingredients	Medicinal importance	References
Millets	Amaranth	*Amaranth cruentus*	Gallic acid, vanillic acid,	Preventing iron and vitamin A deficiency, lower plasma cholesterol, boost immunity, antitumor effects, lower blood sugar, improve and hypertension, anti-allergic and antioxidant properties	Raiger and Jajoriya, 2023
	Pearl millet	*Pennisetum glaucum*	Quercitin	Helps in anemia, constipation, diarrhea, diabetes, bone growth development and repair, aids in the treatment of stomach ulcers, promotes heart health	Malik, 2015
	Sorghum	*Sorghum bicolor* L.	3-deoxyanthocyanidins	Benefit the gut microbiota and factors associated with obesity, oxidative stress, inflammation, diabetes, dyslipidemia, cancer, and hypertension.	Cardoso, 2017
	Kodo millet	*Paspalum scrobiculatum*	Catechin, luteolin, kaempherol	Atherosclerosis, diabetic heart disease, migraines, high blood pressure, asthma, and heart attacks.	Bunkar *et al*., 2021
	Finger millet	*Eleusine coracana*	Ferulic acid, quercitin, feraxans	Increase in haemoglobin levels, aids in aging, metabolic syndrome, depression, anxiety, migraines, and insomnia.	Rishitha and Soni, 2024
	Little millet	*Panicum sumatrense*	Campesterol, tricin, luteolin	Inflammation, diabetes, cancer, heart disease, obesity, and gastrointestinal issues.	Srilekha *et al*., 2019
	Barnyard millet	*Echinochloa Species*	Apigenin, 3,7-dimethylquercetin, isorhamnetin	lower cholesterol and blood sugar levels, lower the risk of diabetes persuaded cataract illness, lower the risk of cardiovascular disorders	Rani *et al*., 2023
	Foxtail	*Setaria italica*	Kaempherol	Moderate glycemic index, prevention of diabetes and cardiovascular illnesses, improves digestion and relieves constipation	Hariprasanna, 2016
	Proso Millet	*Panicum miliaceum* L.	Ferulic acid, chlorogenic acid	Promote healing and reduce blood levels of low-density lipoprotein cholesterol and liver damage.	Kalinová, 2007
	Browntop Millet	*Brachiaria ramose*	Quinones	Used to treat lifestyle disorders, reduces the risk of duodenal ulcers, diabetes, and cardiovascular illnesses	Nevedhitha and Priya, 2022
	Buckwheat	*Fagopyrum tataricum Gaertn*	Quercitin, fagopyrin, rutin, D-chiro-inositol	Prevent cancer, or neurological disorders, plasma cholesterol level reduction, neuroprotection, anticancer, anti-inflammatory	Bastida *et al*., 2015

Grains	Highland Barley	*Hordeum vulgare*	β-glucan, β-sitosterol,campesterol,β-tocotrienol, α-tocotrienol,	Anti-inflammatory, anticancer, antidiabetic, antibacterial, anti-obesity, antioxidant, antifatigue	Obadi *et al*., 2021
	Quinoa	*Chenopodium quinoa Willd*	Quercitin, kaempherol	Improve digestibility, lower risk of type 2 diabetes and cardiovascular disease,	Agrawal, 2018
	Black Rice	*Oryza sativa L. indica*	γ- oryzanol	Curative effect, anti-carcinogenic and anti-oxidant properties, protects arteries, regulates blood lipids, prevents oxidative DNA damage, immunity, and improves liver function.	Kumari, 2020
	Rye	*(Secale cereale L.)*	Alkylresorcinols, tocotrienols	Prevents myocardial infarctions, defensive impact against ischemic stroke and diabetes, CVD,	Poutanen *et al*., 2014
	Wild Rice	*(Zizania spp.)*	γ-oryzanol	Treatment of insulin resistance and lipotoxicity,	Pawlik and Aladedunye, 2017
	Corn grain	*(Zea mays L.)*	Lutein, β-cryptoxanthin	Lowers the risk of acquiring chronic diseases such as cardiovascular disease, type 2 diabetes,.	Tang *et al*., 2014
	Whole wheat	(*Triticum aestivum* L.)	Alkylresorcinol, benzoxazinoids	Reduce the risk of CVD, type 2 diabetes, decrease blood pressure, improve blood glucose levels, and enhance	Dalton *et al*., 2012
	Oats	*Avena sativa*	β-glucan, β-sitosterol, ester-linked glycerol conjugates, anthranilic acids	Therapeutically active against diabetes, high blood pressure, inflammatory state, and dyslipidemia.	Varma *et al*., 2016
Beans and Peas	Black bean	*Phaseolus vulgaris*	Myricetin, quercitin, kaempherol	Antioxidant, antidiabetic, anti-inflammatory, antimutagenic properties.	Meenu *et al*., 2023
	Black eyed bean	*Vigna unguiculata*	quercitin, kaempherol	Prevents bone break, fracture and osteoporosis, reduction of blood pressure, reduce the risk of diabetes type-2	Ezike *et al*., 2020
	Chick pea	*Cicer arietinum*	Catechin, genistein	Utilized for blood enrichment, treating skin problems, ear infections, and liver and spleen disorders.	Jukanti *et al*., 2012
	Kidney beans	*(Phaseolus vulgaris L.)*	γ- tocopherol	Reduce the reactive oxygen species, antimicrobial, antioxidant, antihyperglycemic, diseases, and neurodegenerative disorders.	Singh *et al*., 2021
	Lentils	*Lens culinaris L.*	Flavan-3-ols	Anticarcinogenic, hypoglycemic, hypocholesterolemic, and blood pressure-lowering.	Faris *et al*., 2013
	Peas	*Pisum sativum*	Apigenin, quercitin	Antimicrobial activities, prevention of degenerative	Kour *et al*.,

				diseases like coronary heart disease	2020
	Split Peas	*Pisum sativum*	Quercitin	Reduction in the risk of major chronic diseases, protect the body against harmful effects of free radicals, anti-cancer properties	Busambwa *et al*., 2016
	Edamame	*Glycine max (L.) Merr.*	Isoflavone	Increases bone density, reduction of cholesterol levels, prevention of cardiovascular disease, and reduction in mammary and prostate cancers	Xu *et al*., 2016
	Lima Bean	*Phaseolus lunatus*	Linamarin	Lowers cholesterol, prevents blood sugar levels from rising too rapidly, prevent heart disease	Farinde *et al*., 2018
	Navy Beans	*(Phaseolus vulgaris)*	Ferulic acid, p-coumaric acid	Anti-inflammatory, beneficial effect on critical aspects of the obese phenotype, promote intestinal health,	Monk *et al*., 2019
	Pinto Bean	(*Phaseolus vulgaris* L.)	γ-tocopherol, α-tocopherol	Protect against oxidative stress, cardiovascular disease, diabetes, metabolic syndrome, and many types of cancer	Câmara *et al*., 2013
	Pink Bean	*(Phaseolus vulgaris, var. Gloria)*	Quercitin, Myricetin	Protective and therapeutic effects related to conditions such as coronary heart disease, diabetes mellitus, obesity, and cancer	Silva and Luh, 1979
Vegetable	Artichokes	*Cynara cardunculus*	Inulin, 5-*O*-Dicaffeoylquinic acid and 5-*O*-caffeoylquinic acid	Hepatic diseases, jaundice, dyspepsia, chronic albuminuria, postoperative anemia, diuretic, liver tonic	Falco *et al*., 2015
	Arugula	*Eruca sativa*	Kaempferol	Diuretic, antiscorbutic, anticancer, antimicrobial, anti-inflammatory, radioprotective, antidiabetic, cytoprotective and antioxidant activities	Jilani *et al*., 2015
	Asparagus	*Asparagus officinalis*	Diosgenin and quercetin-3-glucuronide	Reduce the risk of constipation, diarrhea, osteoporosis, obesity, cardiovascular disease, rheumatism and diabetes, anticancer, antioxidant,	Iqbal *et al*., 2017
	Mung Bean sprouts	*Vigna radiata*	p-hydroxybenzoic, Protocatechuic, p-coumaric, Ferulic	Antioxidant effects, Antimicrobial activity, Anti-inflammatory activity, Antidiabetic effects, Lipid metabolism accommodation	Tang *et al*., 2014
	Beet greens	*Beta vulgaris*	Rutin	Reduce risk of developing degenerative diseases such as cancer, diabetes, cardiovascular diseases	Câmara *et al*., 2013
	Beet	*Beta vulgaris*	rutin, epicatechin and caffeic acid ,betalains	Lower blood pressure, tumor reduction, decreases the risk of obesity and overall mortality, heart disease,	Mudgal *et al*., 2022

				diabetes and promotes healthy hair, preserve brain function	
	Bell pepper	*Capsicum annum*	Capsaicin, dihydrocapsaicin, trans-8-methyl-Nvanillyl-6-nonenamide	Protects against free radicals, reduce risk of cardiovascular disease, promote optimal health, promote lung health, protects against rheumatoid arthritis	Nadeem *et al*., 2011
	Bokchoy	*Brassica rapa var. chinensis*	Kaempferol, isorhamnetin, quercetin	Antioxidant and anticancer properties, reduce various liver diseases including hepatitis and cirrhosis	Naseri *et al*., 2020
	Broccoli	*Brassica oleracea var. italica*	Kaempferol, quercetin glucosides, isorhamnetin, glucosinolates	Immunity modulation, detoxification, eye health, bone health, and antimicrobial, anticancer and antioxidant properties	Nagraj *et al*., 2020
	Brussel sprouts	*Brassica oleracea var. gemmifera*	Sinigrin, glucobrassicin, Gluconapin, kaempferol	Reduces the risk of cancer, protect against coronary heart disease, antioxidant activity	Shanmugam *et al*., 2018
	Carrots	*Daucus carota*	Kaempferol, quercetin, luteolin, caffeic, p-hydroxybenzoic acids	Antioxidant activity, anticarcinogenic, immunoenhancer, Anti-diabetic, cholesterol and cardiovascular disease lowering, anti-hypertensive, hepatoprotective, renoprotective,wound healing	Câmara *et al*., 2013
	Collard greens	*Brassica oleracea L. var. acephala*	Kaempferol glycosides and acylgentiobiosides	Prevent lung, breast, bladder, prostate, colon and ovarian cancer	Davis *et al*., 2005
	Cauliflower	*Brassica oleracea var. botrytis L*	Quercetin, Protocatechuic	antiatherosclerotic, anti-inflammatory, antitumour, antithrombogenic, antiosteoporotic, and antiviral effects	Ahmed and Ali, 2013
	Celery	*Apium graveolens*	Apigravrin, celereoside, bergapten, osthenol, apiumoside, isoimperatorin, celerin	Diuretic, antimicrobial activity, antiparasitic, cardioprotective, gastroprotective,neuroprotective, hypolipidemic, cytotoxic, antioxidant, anti-inflammatory, and anti-infertility	Khairullah *et al*., 2021
	Chayote	*Sechium edule*	Vicenin-2, vitexin, apigenin 6-C-β-Dglucopyranosyl-8-C-β-D- 10 apiofuranoside	Diuretic or kidney stones dissolving capacity, anti-diabetic, anti-cardiovascular, anti-obesity, anti-inflammatory, anti-ulcer, anticancer, antimutagenic, antimicrobial, anti-epileptic and hepatoprotective properties	Vieira *et al*., 2019
	Chilli pepper	*Capsicum baccatum*	Capsaicin	Therapeutic properties for different types of cancer, rheumatism, stiff joints, bronchitis and chest colds	Saleh *et al*., 2018;

				with cough and headache, arthritis, heart arrhythmias and used as stomachic	Rani *et al*., 2023
	Cilantro	*Coriandrum sativum L.*	Caffeic, chlorogenic acid, quercetin, keampferol, rhamnetin, apigenin	Used in the preparation of many household medicines to cure bed cold, seasonal fever, nausea, vomiting, stomach disorders, used as a drug for indigestion, against worms, rheumatism and pain in the joints	Rajeshwari and Andallu, 2011
	Corn	*Zea mays L.*	Ferulic acid, coumaric acid, and syringic acid	Reduce risk of developing cardiovascular disease, type 2 diabetes, and obesity	Siyuan *et al*., 2018
	Cucumber	*Cucumis sativus* L.	Cucurbitacins, cucumerin, vitexin, orientin	Anti-diarrheal, detoxicant and anti-gonorrheal agent, antioxidant, antiwrinkle, antimicrobial, antidiabetic, and hypolipidemic, anti-cancer activity,	Mukherjee *et al*., 2013
	Dandelion greens	*Taraxacum officinale* L.	Chicoric acid, taraxasterol (TS), chlorogenic acid, and sesquiterpene lactones	Reduce the risk of cancer, obesity, hepatitis, arthritis and cardiovascular disease, control and treatment of type2 diabetes	Lis and Olas, 2019
	Eggplant	*Solanum melongena* L.	Hydroxycinnamic acids, Caffeoylquinic acid	Reduce the risk of cancer, cardio vascular diseases, pre-menstrual syndrome, amenorrhea, ante natal anaemia and cholesterol, aids in the decrease of cardiovascular diseases (stroke, cardiac arrest, heart diseases)	Fraikue, 2018
	Endive	*Cichorium endivia* L.	Kaempferol, glucosinolates, sesquiterpene lactones	Aids in digestion, radical scavenging functions, hepatoprotective activity, antioxidant activity	Sowińska and Uklańska, 2010
	Green beans	*Phaseolus vulgaris*	Lutein, zeaxanthin, asquercetin, procyanidins	Alzheimer's disease, cancer, promote fertility in women, help with depression, prevent bone deterioration and osteoporosis	Chaurasia, 2020
	Jicama	*Pachyrhizus erosus*	Inulin	Preventive and therapeutic effects against diet-induced metabolic diseases, particularly Type2 Diabetes Mellitus, immunomodulatory activity, reduce the risk of colon cancer	Santoso *et al*., 2021,
	Kale	*Brassica oleracea L. var. acephala*	Quercetin, kamempferol, hydroxycinnamic acids	Management of macular disease, bilirubin metabolism, protective role in coronary artery disease, Anti-inflammatory activity, Antigenotoxic ability	Satheesh and Fanta, 2020
	Kohlrabi	*Brassica oleracea var.*	Glucoerucin, glucoraphanin	Control body weight, protects against colon and prostate cancer, anti-hyperglycemic	Choi *et al*., 2010

	Leeks	*Allium fistulosum L.*	Allicin, quercetin	Promotion of blood circulation, lowering of cholesterol, relief of fatigue, anti-inflammation, anti-bacteria, regulation of cell metabolism	Xie *et al*., 2023
	Mushroom	*Ganoderma lucidum*	Triterpenes, b-glucan-chitin complexes	Anti-tumour, antioxidant, antiviral, hypocholesterolemic and hypoglycaemic effects, boosts the immune system, anti-cancer function	Cheung, 2010
	Mustard green	*Brassica juncea var. rugosa*	glucosinolates, isothiocyanates	Aid in the treatment of arthritis, asthma, and nervous system diseases, protects from iron deficiency, osteoporosis	Meena *et al*., 2022
	Nopales	*Opuntia ficus-indica (L.) Mill.*	indicaxanthin, neobetanin	Antiulcerogenic, antioxidant, anticancer, neuroprotective, hepatoprotective,anti-inflammatory, hypoglycemic, antimicrobial properties, lower cholesterol level	Mostafa *et al*., 2014
	Okra	*Abelmoschus esculentus*	Hyperin, Coumarin scopoletin, Flavonoid glycoside	Eye-Sight Improvement and Skin Nourishment, Vital Substance for Optimum Pregnancy	Chowdhury *et al*., 2019
	Onions	*Allium cepa*	Quercetin,rutin,kaempferol, s-alkyl-l-cysteine sulphoxides	Anti-inflammatory, antioxidant, anti-obesity, anti-diabetic, anticancer, anti-allergic, cardiovascular protective, neuroprotective, respiratory protective	Ren and Zhou, 2021
	Parsley	*Petroselinum crispumneapolitanum*	Zeaxanthin, lutein, cryptoxanthin, apigenin, myricetin	Prevent age-related macular degeneration inside the retina (eye), promote osteoblastic activity in the bones, diuretic, breath cleanser	Ajmera *et al*., 2019
	Parsnips	*Pastinaca sativa L.*	Furanocoumarins, polyacetylenes	Antibacterial, antiviral, anticancer, anti-inflammatory, prevent blood clots	Kim *et al*., 2022
	Portobella mushroom	*Agaricus Bosporus*	Lectins	Anti-angiogenic, anti-proliferative, and other anti-cancer properties in relation to stomach, colorectal, breast, and prostate cancers, promote an anti-tumor immune response	Lister, 2015
	Red cabbage	*Brassica oleracea L. var. capitata f. rubra*	Lupeol, sinigrin, and sulforaphane	Decrease the risk of cardiovascular diseases, brain disorders and cancer, inhibit the growth of tumors, reduce inflammation and fight bacteria	Draghici *et al*., 2013
	Zucchini	*Cucurbita pepo*	Lutein and zeaxanthin carotenoids, tocopherols, phenols, terpenoids,	Gastrointestinal diseases and intestinal parasites, antimicrobial, antioxidant, anticancer effects, diabetic patients, benign prostatic hyperplasia, and urinary tract diseases	Dūma *et al*., 2018

	Watercress	*Nasturtium officinale*	β-carotene, lutein, β-cryptoxanthin, phenolic compounds,	Cardiovascular health, anti-inflammatory agents, anticancer potential, antimicrobial agents, and dermatological treatments and hypolipidemic properties	Pinela *et al.*, 2020
	Tomato	*Lycopersicon esculentum*	Flavonoids (rutin, naringenin, kaempferol, quercetin, and phenolic acids),Carotenoid	Antioxidant, cancer, cardiovascular and cerebrovascular diseases, diabetes and hypertension	Dūma *et al*., 2018
	Swiss chard	*Beta vulgaris L. var. cicla*	Phytopigments, flavonoids, alpha-lipoic acid, betacyanin and betaxanthin, Apigenin, β-carotenoid	Anti-diabetes, antioxidant, anti-inflammatory, antimicrobial and cancer chemopreventive	Gamba *et al*., 2021
	Spinach	*Spinacia oleracea*	Polyphenols- para-coumaric acid, ortho-coumaric, and ferulic acid, violaxanthin and β-carotene; flavonoids - querecetin,	Antiproliferative, acute and chronic inflammation, and antioxidant system, cancer, obesity, hyperglycaemia, and hyperlipidaemia. Anti-ageing and osteoporosis, Anti-arthritis, nausea, aversion, constipation, faintness,	Ramaiyan *et al.*, 2020
	Romaine Lettuce	*Lactuca sativa var. longifolia Asterales*	lutein, flavonoids - quercetin and kaempferol, phenolic compound- chicoric acid	Anticancer, Antioxidant,bone growth, muscle strength and blood clotting factors, vision, fertility, embryogenic growth, and immune function,	Venkateish *et al*., 2021
Fruits	Apple	*Malus fusca*	Dietary Fiber, phloridzin, epicatechin, and procyanidin B2	Heart disease Diabetes Cancer (especially colon cancer, prostate cancer, and lung cancer) Dementia, Inflammation, Arthritis, High Cholesterol, Heartburn, Osteoporosis	Volk & Henk, 2016
	Acai berries	*Euterpe oleracea*	Sterols, Dietary Fiber	Strengthening the human immune system, anti-inflammatory action, protection against cancer cells, antioxidant, improve the lipidemic profile	Proestos, 2018
	Apricots	*Prunus armeniaca*	Phenols (caffeic, β- coumaric, pcoumaric, and ferulic acids), flavonoids	anticarcinogenic, anti-oxidant, anti- tumoral, anti-microbial, anti-aggregant, anti- ischemic, anti-allergic, anti-ageing benefits, anti-mutagenic and anti-inflammatory, stomach inflammations, hepatic disorder, tumour formation and chronic heart disease	Fatima *et al*., 2018
	Avocado	*Persea americana*	β-sitosterol, orhamnetin, luteolin, rutin, quercetin, and apigenin	Treatment of diseases such as cancer, HIV, and infections and prevent diseases related to oxidative stress.	Arumugam *et al*., 2021
	Banana	*Musa paradisiaca*	Dietary Fiber (cellulose,	Epilepsy, leprosy, fevers, hemorrhages, acute	Kumar *et al*.,

			hemicellulose, and alpha glucans), Carotenoids (β-carotene, α-carotene, lutein	dysentery and diarrhea, Antifungal and antibiotic properties.mild laxative property, neurodegenerative diseases (Alzheimer's disease), Kidney Health.	2012
	Blackberries	*Rubus fruticosus*	hydroxycinnamic acids, ellagitannins	Antioxidants, anti-inflammatory, antidiabetic, and antimicrobial activities, antitumor, antibacterial, antiviral, antioxidant and immunomodulatory compounds,	Gil-Martínez *et al*., 2023
	Blueberries	*Vaccinium myrtillus*	Kaempferol, luteolin, proanthocyanidins	cerebral function and reduction of neurodegenerative diseases and blood pressure, prevention of various types of cancer, constipation and diarrhea, hepatitis C virus protection and infection of the urinary tract prevention	Proestos, 2018
	CamuCamu berry	*Myciaria dubia*	Flavonoids(myricetin & quercetin), lycopene, rutin, ,tannins	Antioxidative and anti-inflammatory properties, Antimicrobial activity, Anti-Diabetic, Anti-tumorous, antimicrobial, antiproliferative.	Gil-Martínez *et al*., 2023
	Cherimoya (custard apple)	*Annona cherimola*	Ccherianoine, annocherine B, cherimoline, annomolin, romucosine H, anonaine	Epilepsy, cardiac diseases, pathogenic infections, haemorrhage, ulcer, cancer, liver disorders	Srivastava *et al*., 2017
	Cherries/ West Indian cheery	*Prunus avium/Malpighia emarginata*	Phytonutrients-carotenoids phenolics, anthocyanins, and flavonoids	Resistance against infectious agents and scavenging harmful, pro-inflammatory free radicals from the blood and thereby, help boost immunity, and protect the body from cancers, aging, degenerative diseases, inflammation, and infections.	Arumugam *et al*., 2021
	Coconut	*Cocos nucifera*	Quercetin, gallic acid, tannic acid, Flavonoids, Polyphenols	Antioxidant, anti-cancer properties, p protect liver cells from damage, prevented kidney stones and heart disease by reducing myocardial infarction, anti-inflammatory activity	Phonphoem *et al*., 2022
	Cranberry	*Vaccinium oxycoccos*	Proanthocyanidins, quercetin, myricetin, ellagic acid, and chlorogenic acid	Improved lipidemic profile, reduced blood pressure, Cardioprotective properties, antioxidant properties, antibacterial properties, anti-cancerous properties	Proestos, 2018
	Currents (Black)	*Ribes nigrum L. Grossulariaceae*	Caffeic acid, ferulic acid, quercetin, myricetin, Kaempferol, Anthocyanains	Antimicrobial activity, antioxidant properties, cancer, diabetes, arthritis, cardiovascular and neurodegenerative diseases, decrease postprandial blood glucose, ameliorate glucose tolerance, Biosynthesis of collagen,	Bento *et al*., 2022
	Figs	*Ficus carica*	Luteolin, gallic acid,	Renal-protective, anti-obesity, cardioprotective, and	Walia *et al*.,

			chlorogenic acid, syringic acid, catechin, epicatechi, triterpenoids	anticancer activity. These plants are viable in the treatment of stomach ache, piles, skin diseases, inflammation, cancer, kidney, and spleen diseases	2022
	Goji berries	*Lycium barbarum*	L.barbarum polysaccharide (LBP), Zeaxanthin and lutein, Organic germanium, secretagogue, betaine	Anti-aging process, neuroprotection, and metabolism enhancement, along with antidiabetic, antiglaucoma, anticancer, and cytoprotective activities, as well as antioxidant, and immunomodulatory properties.	Shah *et al*., 2019
	Goldenberry	*Physalis peruviana L.*	Carotenoids, phenols, withanolids	Antidiabetic, antihypertensive effects, antioxidant, anti-inflammatory, antitumor, hepatoprotective effects, obesity, cardiovascular diseases, and arthritis,	Silva Dias *et al*., 2014
	Grapefruit	*Citrus paradisi*	naringin, limonoids, furanocoumarins, limonoids, flavonoids, monoterpenes, phytosterols, and polyphenols.	Hypolipidemic, antihypertensive, radical scavenging, antimicrobial, and proliferation inhibition ability of several cancer cells, atherosclerosis, oxidative stress, tumor growth	Murthy *et al*., 2020
	Guava	*Psidium guajava*	Pectin, lutein, zeaxanthin, and lycopene, Quercetin, tannins, phenols, triterpenes, flavonoids, essential oils,	Improvement of food absorption, antihyperglycemic, Wound healing properties.	Bogha *et al*., 2020
	Hippophaes (Sea buckthorns)	*hippophaerhamnoides*	Phytosterols and unsaturated fatty acids (ω-3, ω-6 and ω-9) flavonoids, carotenoids, vitamin C, omega-3 and omega-6 fatty acids and vitamin E	Enhancement of the function of the nervous, Protection against cardiovascular diseases and immune enhancement Antioxidant activity: free radical scavenging, Strong anti-inflammatory, antimicrobial, analgesic, anti-inflammatory and healing action	Proestos, 2018
	Honeydew melon	*Cucumis meloInodorus*	Phytoene, β-carotene, and cucurbitacin-β	Anti-tumour, anticarcinogenic, fighting depression, dandruff, ulcers, stimulating the immune system, Anti-diabetic, Anti-hepatoxic, Anti-asthmatic, vasodilators, Anti-arthritic.	Khalid *et al*., 2021
	Java Plum/ black Plum (Jamun)	*Syzygium cumini*	Terpenoids, malic acid, gallic acid, tannins, oxalic acid, and betulinic acid	Ameliorate micronutrient deficiency, diabetes type 2(hypoglycaemic effects), cardiovascular disease, obesity, boost the immune system, improve digestion	Chuwa, 2023
	Kiwi	*Actinidia deliciosa*	Carotenoids, lutein, phenolics, and chlorophyll, flavonoids, Phytoestrogen	Antioxidant, antitumor, anti-inflammatory properties, anticarcinogenic, neuroprotective, and cardio-protective activity, sleep regulation, for healthy nails, hairs and teeth	Rasheed *et al*., 2021
	Lemon	*Citrus limon*	Flavonoids glycosides,	Antibacterial, antifungal, antidiabetic, anticancer and	Mohanapriya *et*

			coumarins, polyphenols	antiviral activities, antioxidants, and free radical scavengers inhibit cell proliferation.	*al*., 2013
	Lime	*Citrus aurantiifolia*	Flavonoids glycosides, coumarins	weight loss, skin care, good digestion, relief from constipation, eye care, and treatment of scurvy, piles, peptic ulcer	Mohanapriya *et al*., 2013
	Maqui Berry	*Aristoteliachilensis*	Polyphenols,anthocyanins, indole, coumarins, caffeic and ferulic acids,	Prevention of obesity, cancer, cognitive decline, and dementia; the prevention and treatment of bone structure alterations; Antinociceptive effects.	Gil-Martínez *et al*., 2023
	Mango	*Mangiferaindica*	Beta-carotene, lycopene, xanthophylls and lutein	Boosts Immunity, and anti-aging Properties, and fights with oxidative stress, which is linked to colon, lung, prostate, breast, and bone cancers.	Arumugam *et al*., 2021
	Mulberry	*Morus rubra.*	anthocyanins, hydroxycinnamic acids, hydroxybenzoic acid	Reduce the risk of cardiovascular and coronary heart diseases by lowering LDL oxidation and superoxide production, and avoiding lipid peroxidation.	Adamczuk *et al*., 2023
	Oranges	*Citrus sinensis*	Carotenoids - β-cryptoxanthin, xanthophyll, hesperidin, narirutin, limonoids	diabetes, heart disease, and various cancers, antioxidant properties, anti-inflammatory, antiviral, and antimicrobial properties.	Lado *et al*., 2016
	Papaya	*Carica papaya*	Papain and chymopapain (green papaya) Carotenoids- β-carotene and β-cryptoxanthin	colon, lung, and prostate cancers, carminative, stomachic, diuretic and antiseptic, cardiovascular, immune, and digestive systems, reduce inflammation.	Ali *et al*., 2011
	Passion fruit	*Passiflora edulis*	Apigenin, luteolin, quercetin, and kaempferol	antipyretic, antioxidant, sedative, tranquilizing, anxiolytic, anti-inflammatory, anticonvulsant, antihypertensive, and analgesic properties	López-Vargas *et al*., 2013
	Peaches	*Prunus persica*	Quercetin, catechins, chlorogenic and neo-chlorogenic acids and cyanidin	Antioxidant properties, antimicrobial and anti-inflammatory properties, diabetes, obesity, hypertension, inflammation, cardiovascular, neurodegenerative, and oncologic diseases	Bento *et al*., 2022
	Pears	*Pyrus communis*	Arbutin-polyphenols, chlorophylls, carotenoids, and triterpenoid- Pentacyclic triterpenes	Antioxidant, anti-inflammatory, and anticancer properties, antiviral, and anticarcinogenic properties, cardiovascular diseases, cancer, diabetes, alzheimer's disease, and atopic dermatitis	Kolniak-Ostek *et al*., 2020
	Persimmons	*Diospyros kaki*	Tannic acid (tannins), phenolic compounds	Antimutagenic, anticarcinogenic and antioxidant activities, blood pressure, mental confusion, irregular heartbeat, muscle weakness and nervousness.	Celik & Ercisli, 2008

	Pineapple	*Ananascomosus*	Bromelain	Anti-inflammatory, antioxidant activity, nervous system function, and healing bowel movement,	Mohsin *et al*., 2020
	Plum	*Prunus domestica*	phytochemicals such as phenolic compounds, anthocyanins, and volatile organic compounds	Laxative, antioxidant, antiviral, antimicrobial, anti-inflammatory and anti-cancerous properties, diabetes, Alzheimer's disease, and various cancers, hepatoprotective activity	Lin *et al*., 2022
	Pomegranate	*Punicagranatum*	punicalagin, polyphenols, ellagitannins, Punicalagin, punicic acid,	Antioxidant activity, Hypertension prevention, and endothelial function improvement, Reducing the risk of cardiovascular disease, anti-inflammatory properties	Proestos, 2018
	Raspberries	*Rubusidaeus*	Polyphenols and flavonoids, dietary Fiber	Antioxidant, Antibacterial and Anti-Biofilm Properties	Adamczuk *et al*., 2023
	Strawberries	*Fragaria ananassa*	Anthocyanin, ellagitannins, catechin, quercetin	Preventing inflammation and oxidative stress, reducing the risk of heart disease, obesity, and cancer, blood sugar, reducing wrinkles, and improving vision	Abbas *et al*., 2022
	Tangerines	*Citrus reticulata*	Carotenoids (-Cryptoxanthin, zeaxanthin, lutein, lycopene, pectin	Dyspepsia, gastrointestinal distension, cough with profuse phlegm, hiccup, and vomiting.Anti-inflammatory, anticholesterolemic,	Musara *et al*., 2020
	Tamarind	*Tamarindus indica*	Hydroxycitric acid	Laxative, expectorant, anti-inflammatory and antioxidant, Cancer, alzheimer's, overweight and obesity, ageing, osteoporosis, antihistaminic properties	Chuwa, 2023
	Watermelon	*Citrullus lanatus*	Lycopene and citrulline	Maintain healthy vision, and immune system, promote healthy cell growth, and cardiovascular health, and collagen synthesis, glowing skin, reduce risk of asthma, atherosclerosis, diabetes, colon cancer, and arthritis.	Montero *et al*., 2023
Seeds	Chia seeds	*Salvia hispanica*	Soluble Fiber - gums, pectins, mucilages, and algal polysaccharides, Insoluble Fiber - cellulose, and hemicelluloses,	Cardiovascular disease, fracture, and Type 2 diabetes, anti-inflammatory, anti-thrombotic and anti-arrhythmic, hypertension, antioxidants, neurodegenerative diseases, cancer, kidney diseases, bone health, weight loss, anti-aging, antibacterial, antimicrobial, antiviral, anti-hepatoxic properties.	Katunzi *et al*., 2021
	Flaxseeds	*Linumusitatissimum*	Secoisolariciresinoldiglucoside (sdg), ferulic acid, pinoresinol,	Hyperlipidaemia, anti-diabetics, hepatoprotective effects, cardiovascular diseases, cancer, acute myeloid	Noreen *et al*., 2023

			lariciresinol, and matairesinol.	leukemia (AML), hyperlipidemia, arthritis, osteoporosis, autoimmune, neurological disorders	
	Hemp seeds	*Cannabis sativa L*	γ-linolenic, stearidonic, linoleic, α-linolenic, oleic, cis-vaccenic, stearic,	Coronary heart diseases, anti-inflammatory, antithrombotic properties, atherosclerosis, enhancing metabolism, and promoting fat-burning, sleep improving and appetite-stimulating, anti-glaucoma.	Montero *et al*., 2023
	Sesame seeds	*Sesamum indicum L*	Sesamin, sesaminol, and gamma-tocopherol	Antihypertension, antioxidation, amenorrhea, dysmenorrhea, ulcers, and haemorrhagic acne, treat respiratory tract infections, infant cholera, diarrhoea, intestinal and bladder diseases	Abbas *et al*., 2022
	Watermelon seeds	*Citrullus lanatus*	Cucurbitacins	Supports cardiovascular and digestive health, Strengthens the immune system, and anti-inflammatory properties, improves male fertility, and supports hair strength,	Chuwa, 2023
	Melon seeds	*Cucumis melo L*	Hydroxycinnamic acid (caffeic, sinapic, ρ-coumaric and ferulic acids)	Anti-inflammatory agents, hypoglycemic agents, antimicrobial, anti-genic, and antioxidant potential, anaemia, atherosclerosis, gout, rheumatism, cardiovascular, kidney, and liver diseases	Khalid *et al*., 2021
	Sacha Inchi seeds	*Plukenetiavolubilis L.*	α-glucosidase and α-amylase, bovine serum albumin (BSA), gallic acid, 4-hydroxybenzoic acid	Alzheimer's disease, Anti-diabetic, hypertension, anti-glycation activities	Kittibunchakul *et al*., 2022
	Pumpkin seeds	*Cucurbita pepo L*	Vanillic acid, tyrosol, o-coumaric acid, caffeic acid,triterpenes, phytoestrogens, and saponins.	Anthelmintic activity¸ anti-inflammatory and anti-prostatic hypertrophy efficiencies.	Dowidar *et al*., 2020
	Sunflower seeds	*Helianthus annuus L.*	Tocopherols, phytosterols, triterpene glycosides, α-tocopherol, glutathione reductase, chlorogenic acid, caffeic acid	Anti-asthmatic, dysentery, cough, skin rashes, diarrhea, sores, obesity, cardiovascular, neurological diseases, Anticancer, diabetes, Anti-cholesterol benefits, cataracts, carcinoma, and premature aging	Barreca *et al*., 2020
Nuts	Walnuts	*Juglans regia*	δ- tocopherol	Cardiovascular diseases, cancer, diabetes, reduces LDL cholesterol, dry hair, dandruff, head wounds, arteriosclerosis, Anti-malarial, pregnancy protection, sperm improvement, weight management	Oke *et al*., 2020

	Peanuts	*Arachis hypogaea*	Arginine, soluble and insoluble Fiber, luteolin, quercetin, kaempferol, rutin, isoflavones (phytoestrogens), ellagic acid,	Antioxidant, Co-enzyme in metabolism, aids in red blood cell production, maintains proper function of neurons, eyes, skin, and liver,	Syed *et al.*, 2021
	Pecans	*Caryaillinoinensis*	Ellagic acid, epigallocatechin3-gallate	Obesity, cardiovascular, neurological diseases, cancer, high-antioxidant capacity, immune response, inflammatory process, and regulate cholesterol homeostasis.	Ferrari *et al.*, 2022
	Hazelnuts	*Corylus avellana*	Fatty acids.tocopherol, phytosterols, Phenolics, flavnoids	Cardiovascular diseases, colon cancer, antiulcer, vasodilatory, analgesic effects, and diabetes	Balik, 2021
	Brazil nuts	*Bertholletiaexcelsa*	Phenolics ellagic acid, vanillic	Prevent aging-related diseases, heavy metal, and xenobiotic detoxification, and thyroid hormone regulation.	Cardoso *et al.*, 2017
	Pistachio Nuts	*Pistacia vera L.*	Catechin, epicatechin, quercetin, kaempferol, luteolin, apigenin	Antioxidant, Anti-Diabetic, anti-inflammatory, anti-microbial, and anti-viral effects, skin health, anti-aggregative, cardioprotective, antibacterial, and anticancer activities	Mandalari *et al.*, 2021
	Almonds	*Prunus dulcis*	α-tocopherol, ellagitannins, gallo-tannins, ellagic acid, kaempferol	Antioxidant, Anti-Diabetic, anti-inflammatory, anti-microbial, skin health, anti-aggregative, cardioprotective, obesity, hypertension, antibacterial, and anticancer activities	Barreca *et al.*, 2020

Results and Discussion

Superfoods, known for their high nutrient density and health-promoting characteristics, have received a lot of attention for their ability to improve general health and avoid chronic diseases.

A thorough evaluation of current data demonstrates that these nutrient-dense meals provide numerous health benefits. They are well-known for their high concentrations of vitamins, minerals, antioxidants, and phytonutrients, which help to boost cardiovascular health, immunological function, and cognitive functioning. Specific Superfoods, such as berries, leafy greens, nuts, seeds, and fatty fish, have been shown to reduce inflammation, lower cholesterol, and improve metabolic health. Berries, for example, are high in antioxidants that counteract oxidative stress, whereas fatty fish include vital omega-3 fatty acids that promote heart health and cognitive function. Furthermore, include these superfoods in your diet may help with weight management and promote healthy aging. Adopting a superfood-rich diet thus not only benefits individual health but also adds to a holistic approach to wellbeing, highlighting the deep impact of nutrient-dense foods on long-term health and vitality.

Author Contribution

Jyoti Rani: Investigation, formal analysis, writing—original draft. Sakshi Saini: Validation, methodology, writing—reviewing. Hitashi Jain:—Formal analysis, writing—review and editing.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

References

Abbas, S., Sharif, M. K., Sibt-e-Abbas, M., FikreTeferra, T., Sultan, M. T., and Anwar, M. J. (2022). Nutritional and therapeutic potential of sesame seeds. *Journal of Food Quality*, *2022*(1), 6163753. https://doi.org/10.1155/2022/6163753

Adamczewska-Sowińska, K., & Uklańska, C. M. (2010, August). The effects of blanching on biological value of endive (*Cichorium endivia* L.). In *XXVIII International Horticultural Congress on Science and Horticulture for People (IHC2010): International Symposium on 934* (pp. 1197-1204). https://doi.org/10.13140/2.1.2940.4800

Adamczuk, N., Ośko, J., Grembecka, M., Konieczyński, P., Migas, P., Orzeł, A.,... & Krauze-Baranowska, M. (2023). Evaluation of the Content of Micro-and Macroelements in Raspberries Depending on the Species, Cultivar Variety, and Geographical Environment. *Nutrients*, *15*(17), 3782.

Agrawal, R. S. (2018). Quinoa—Supergrain of the future: A Review. *Pharma Innov*, *7*, 249-251.

Ahmed, F. A., & Ali, R. F. (2013). Bioactive compounds and antioxidant activity of fresh and processed white cauliflower. *BioMed research international*, *2013*(1), 367819.

Ajmera, P., Kalani, S., & Sharma, L. (2019). Parsley-benefits & side effects on health. *International Journal of Physiology, Nutrition and Physical Education*, *4*(1), 1236-1242.

Ali, A., Devarajan, S., Waly, M., Essa, M. M., & Rahman, M. S. (2011). Nutritional and medicinal value of papaya (*Carica papaya* L.). Natural products and bioactive compounds in disease prevention, 34-42.

Anitha S, Kane-Potaka J, Botha R, Givens DI, Sulaiman NLB, Upadhyay S, Vetriventhan M, Tsusaka TW, Parasannanavar DJ, Longvah T, Rajendran A, Subramaniam K and Bhandari RK (2021) Millets Can Have a Major Impact on Improving Iron Status, Hemoglobin Level, and in Reducing Iron Deficiency Anemia–A Systematic Review and Meta-Analysis. Front. Nutr. 8:725529. https://doi.org/10.3389/fnut.2021.725529

Anushia, K., Uma Mageshwari, J., Trueman, P., & Viswanathan, V. (2019). The effect of millet supplementation on weight and lipid profile. *TAPI J.*, *13*, 1-7.

Arumugam, T., Sona, C. L., & Maheswari, M. U. (2021). Fruits and vegetables as Superfoods: Scope and demand. *J. Pharm. Innov*, *10*, 119-129.

Balik, H. I. (2021). Bioactive compounds and fatty acid composition of new Turkish hazelnut cultivars. *International Journal of Fruit Science*, *21*(1), 106-114.

Barreca, D., Nabavi, S. M., Sureda, A., Rasekhian, M., Raciti, R., Silva, A. S., and Mandalari, G. (2020). Almonds (*Prunus dulcis* Mill. DA webb): A source of nutrients and health-promoting compounds. *Nutrients*, *12*(3), 672. https://doi.org/10.3390/nu12030672

Bento, C., Goncalves, A. C., Silva, B., and Silva, L. R. (2022). Peach (*Prunus persica*): Phytochemicals and health benefits. *Food Reviews International*, 38(8), 1703-1734.

Bogha, T. T., Sawate, A. R., Kshirsagar, R. B., and Bochare, S. S. (2020). Studies on physical, chemical and mineral evaluation of guava (*Psidium guajava* L.). Pharma Innovation Journal, 9(3), 117-119.

Bunkar, D. S., Goyal, S. K., Meena, K. K., and Kamalvanshi, V. (2021). Nutritional, functional role of kodo millet and its processing: A review. *International Journal of Current Microbiology and Applied Sciences*, *10*(01), 1972-1985. https://doi.org/10.20546/ijcmas.2021.1001.229

Busambwa, K., Sunkara, R., Diby, N., Offei-Okyne, R., Boateng, J., and Verghese, M. (2016). Cytotoxic and apoptotic effects of sprouted and non-sprouted lentil, green and yellow split-peas. *Int. J. Cancer Res*, *12*, 51-60.

Câmara, C. R., Urrea, C. A., & Schlegel, V. (2013). Pinto beans (*Phaseolus vulgaris* L.) as a functional food: Implications on human health. *Agriculture*, *3*(1), 90-111. https://doi.org/10.3390/agriculture3010090

Cardoso, B. R.; Duarte, G. B. S.; Reis, B. Z. & Cozzolino, S. M. F. (2017) Brazil Nuts: Nutritional Composition, Health Benefits and Safety Aspects. *Food*, 100, 9–18

Celik, A., and Ercisli, S. (2008). Persimmon cv. Hachiya (*Diospyros kaki* Thunb.) fruit: some physical, chemical and nutritional properties. *International Journal of Food Sciences and Nutrition*, *59*(7-8), 599-606. https://doi.org/10.1080/09637480701538221

Chaurasia, S. (2020). Green beans. In *Nutritional composition and antioxidant properties of fruits and vegetables* (pp. 289-300). Academic Press.

Cheung, P. C. (2010). The nutritional and health benefits of mushrooms. *Nutrition Bulletin*, *35*(4), 292-299.

Choi, S. H., Ryu, D. K., Park, S. H., Ahn, K. G., Lim, Y. P., and An, G. H. (2010). Composition analysis between kohlrabi (*Brassica oleracea* var. gongylodes) and radish (*Raphanus sativus*). *Horticultural Science & Technology*, *28*(3), 469-475.

Chowdhury, N. S., Jamaly, S., Farjana, F., Begum, N., and Zenat, E. A. (2019). A review on ethnomedicinal, pharmacological, phytochemical and pharmaceutical profile of lady's finger (*Abelmoschus esculentus* L.) plant. *Pharmacology & Pharmacy*, *10*(02), 94-108.

Chuwa, C. (2023) Nutrition and Health Benefits of Indigenous Fruits from African Tropical Trees (Baobab, Tamarind, Jamun and Smelly Berry).

Clemente, A., and Olias, R. (2017). Beneficial effects of legumes in gut health. Current Opinion in Food Science, 14, 32-36. https://doi.org/10.1016/j.cofs.2017.01.005

Dai, X., Stanilka, J. M., Rowe, C. A., Esteves, E. A., Nieves Jr, C., Spaiser, S. J., and Percival, S. S. (2015). Consuming *Lentinula edodes* (Shiitake) mushrooms daily improves human immunity: A randomized dietary intervention in healthy young adults. *Journal of the American College of Nutrition*, *34*(6), 478-487.

Dalton, S. M. C., Tapsell, L. C., and Probst, Y. (2012). Potential health benefits of whole grain wheat components. *Nutrition Today*, *47*(4), 163-174. https://doi.org/10.1097/NT.0b013e31826069d0

Davis, E. H., and Morgan, J. T. (2005). Collards in North Carolina. *southeastern geographer*, *45*(1), 67-82.

De Falco, B., Incerti, G., Amato, M., and Lanzotti, V. (2015). Artichoke: botanical, agronomical, phytochemical, and pharmacological overview. *Phytochemistry reviews*, *14*, 993-1018. https://doi.org/10.1007/s11101-015-9428-y

Dowidar, M., Ahmed, A., and Mohamed, H. (2020). The critical nutraceutical role of pumpkin seeds in human and animal health: An updated review. *Zagazig Veterinary Journal*, *48*(2), 199-212. https://doi.org/10.21608/zvjz.2020.22530.1097

Draghici, G. A., Lupu, M. A., Borozan, A. B., Nica, D., Alda, S., Alda, L., and Bordean, D. M. (2013). Red cabbage, millennium's functional food.

Dūma, M., Alsiņa, I., Dubova, L., and Erdberga, I. (2018, March). Bioactive compounds in tomatoes at different stages of maturity. In *Proceedings of*

the Latvian Academy of Sciences. Section B. Natural, Exact, and Applied Sciences. (Vol. 72, No. 2, pp. 85-90). https://doi.org/10.2478/prolas-2018-0014

El-Mostafa, K., El Kharrassi, Y., Badreddine, A., Andreoletti, P., Vamecq, J., El Kebbaj, M. H. S., and Cherkaoui-Malki, M. (2014). Nopal cactus (*Opuntia ficus-indica*) as a source of bioactive compounds for nutrition, health and disease. *Molecules*, *19*(9), 14879-14901. https://doi.org/10.3390/molecules190914879

Engelhard, Y. N., Gazer, B., and Paran, E. (2006). Natural antioxidants from tomato extract reduce blood pressure in patients with grade-1 hypertension: a double-blind, placebo-controlled pilot study. American heart journal, 151(1), 100-e6. https://doi.org/10.1016/j.ahj.2005.05.008

Farinde, E. O., Olanipekun, O. T., and Olasupo, R. B. (2018). Nutritional composition and antinutrients content of raw and processed lima bean (*Phaseolus lunatus*). *Ann. Food Sci. Technol*, *19*(2), 250-264.

Faris, M. E. A. I. E., Takruri, H. R., and Issa, A. Y. (2013). Role of lentils (*Lens culinaris* L.) in human health and nutrition: a review. *Mediterranean Journal of Nutrition and Metabolism*, *6*(1), 3-16.

Fatima, T., Bashir, O., Gani, G., Bhat, T., and Jan, N. (2018). Nutritional and health benefits of apricots. *International Journal of Unani and Integrative Medicine*, *2*(2), 5-9.

Fernández-Ríos, A., Laso, J., Hoehn, D., Amo-Setién, F. J., Abajas-Bustillo, R., Ortego, C., and Margallo, M. (2022). A critical review of superfoods from a holistic nutritional and environmental approach. *Journal of Cleaner Production*, *379*, 134491.

Ferrari, V., Gil, G., Heinzen, H., Zoppolo, R., and Ibáñez, F. (2022). Influence of cultivar on nutritional composition and nutraceutical potential of pecan growing in Uruguay. *Frontiers in Nutrition*, *9*, 868054. https://doi.org/10.3389/fnut.2022.868054

Fraikue, F. B. (2018). Review of Historical, Health Benefts and Uses of Eggplants by Humankind. *Asian Journal of Management*, *9*(1), 471-474.

Franco Lucas, B., Costa, J. A. V., and Brunner, T. A. (2021). Superfoods: drivers for consumption. *Journal of Food Products Marketing*, *27*(1), 1-9.

Galanakis, C. M. (Ed.). (2019). *The role of alternative and innovative food ingredients and products in consumer wellness*. Academic Press.

Gamba, M., Raguindin, P. F., Asllanaj, E., Merlo, F., Glisic, M., Minder, B., and Muka, T. (2021). Bioactive compounds and nutritional composition of Swiss chard (*Beta vulgaris* L. var. cicla and flavescens): a systematic review. *Critical reviews in food science and nutrition*, *61*(20), 3465-3480. https://doi.org/10.1080/10408398.2020.1799326

García-Milla, P., Peñalver, R., and Nieto, G. (2024). A Review of the Functional Characteristics and Applications of *Aristotelia chilensis* (Maqui Berry), in the Food Industry. Foods, 13(6), 838. https://doi.org/10.3390/foods13060838

Gil-Martínez, L., Mut-Salud, N., Ruiz-García, J. A., Falcón-Piñeiro, A., Maijó-Ferré, M., Baños, A., and Gómez-Caravaca, A. M. (2023). Phytochemicals determination, and antioxidant, antimicrobial, anti-inflammatory and anticancer activities of blackberry fruits. *Foods*, *12*(7), 1505. https://doi.org/10.3390/foods12071505

Gimenez-Bastida, J. A., and Zielinski, H. (2015). Buckwheat as a functional food and its effects on health. *Journal of agricultural and food chemistry*, *63*(36), 7896-7913. https://doi.org/10.1021/acs.jafc.5b02498

Godswill, A. G., Somtochukwu, I. V., Ikechukwu, A. O., and Kate, E. C. (2020). Health benefits of micronutrients (vitamins and minerals) and their associated deficiency diseases: A systematic review. *International Journal of Food Sciences*, *3*(1), 1-32.

Grancieri, M., Verediano, T. A., Sant'Ana, C. T., de Assis, A., Toledo, R. L., de Mejia, E. G., and Martino, H. S. D. (2022). Digested protein from chia seed (*Salvia hispanica* L) prevents obesity and associated inflammation of adipose tissue in mice fed a high-fat diet. *PharmaNutrition*, *21*, 100298. https://doi.org/10.1016/j.phanu.2022.100298

Halliwell, B., and Gutteridge, J. M. (2007). Free radicals in biology and medicine. Oxford, USA: Oxford University Press.

Hariprasanna, K. (2016). Foxtail millet: Nutritional importance and cultivation aspects. *Indian farming*, *73*(1), 47-49.

Hoque, M., Emon, K., Malo, P. C., Hossain, M. H., Tannu, S. I., and Roshed, M. M. (2023). Comprehensive guide to vitamin and mineral

sources with their requirements. *Indiana Journal of Agriculture and Life Sciences*, *3*(6), 23-31. https://doi.org/10.5281/zenodo.10284736

Iqbal, M., Bibi, Y., Raja, N. I., Ejaz, M., Hussain, M., Yasmeen, F.,... & Imran, M. (2017). Review on therapeutic and pharmaceutically important medicinal plant *Asparagus officinalis* L. *J Plant BiochemPhysiol*, *5*(180), 2.

Jagdale, Y. D., Mahale, S. V., Zohra, B., Nayik, G. A., Dar, A. H., Khan, K. A., and Karabagias, I. K. (2021). Nutritional profile and potential health benefits of super foods: a review. *Sustainability*, *13*(16), 9240. https://doi.org/10.3390/su13169240

Jilani, M. I., Ali, A., Rehman, R., and Nisar, S. S. S. (2015). Health benefits of Arugula: A review. *International Journal of Chemical and Biochemical Sciences*, *8*, 65-70.

Jukanti, A. K., Gaur, P. M., Gowda, C. L. L., and Chibbar, R. N. (2012). Nutritional quality and health benefits of chickpea (*Cicer arietinum* L.): a review. *British Journal of Nutrition*, *108*(S1), S11-S26. https://doi.org/10.1017/S0007114512000797

Kalinová, J. (2007). Nutritionally important components of proso millet (*Panicum miliaceum* L.). *Food*, *1*(1), 91-100.

Katsirma, Z., Dimidi, E., Rodriguez-Mateos, A., and Whelan, K. (2021). Fruits and their impact on the gut microbiota, gut motility, and constipation. *Food & function*, *12*(19), 8850-8866. https://doi.org/10.1039/d1fo01125a

Katunzi-Kilewela, A., Kaale, L. D., Kibazohi, O., and Rweyemamu, L. M. (2021). Nutritional, health benefits and usage of chia seeds (*Salvia hispanica*): A review. *African Journal of Food Science*, *15*(2), 48-59.

Khairullah, A. R., Solikhah, T. I., Ansori, A. N. M., Hidayatullah, A. R., Hartadi, E. B., Ramandinianto, S. C., and Fadholly, A. (2021). Review on the Pharmacological and Health Aspects of *Apium graveolens* or Celery: An Update. *Systematic Reviews in Pharmacy*, *12*(2).

Khalid, W., Ikram, A., Afzal, F. A., Ambreen, S., Aziz, A., Sadiq, A., and Ahmad, M. (2021). Chemical composition and health benefits of melon seed: a review.

Kim, D. S., Iida, F., & Joo, N. (2022). Texture properties of parsnip (*Pastinaca sativa* L.) for the elderly base on the enzyme treatment. *International Journal of Food Science & Technology*, *57*(10), 6730-6743. https://doi.org/10.1111/ijfs.16032

Kittibunchakul, S., Hudthagosol, C., Sanporkha, P., Sapwarobol, S., Temviriyanukul, P., and Suttisansanee, U. (2022). Evaluation of sachainchi (*Plukenetia volubilis* L.) by-products as valuable and sustainable sources of health benefits. *Horticulturae*, *8*(4), 344. https://doi.org/10.3390/horticulturae8040344

Klensporf-Pawlik, D., and Aladedunye, F. (2017). Wild rice: Nutritional and health-promoting attributes. In *Gluten-free ancient grains* (pp. 271-296). Woodhead Publishing. https://doi.org/10.1016/B978-0-08-100866-9.00010-8

Kolniak-Ostek, J., Kłopotowska, D., Rutkowski, K. P., Skorupińska, A., and Kruczyńska, D. E. (2020). Bioactive compounds and health-promoting properties of pear (*Pyrus communis* L.) fruits. Molecules, 25(19), 4444. doi: 10.3390/molecules25194444

Kour, J., Nayik, G. A., ul Haq, R., Anand, N., Shafiq Alam, M., Ramaiyan, B., and Banerjee, S. (2020). Pea. *Antioxidants in Vegetables and Nuts-Properties and Health Benefits*, 3-17.

Kumar, K. S., Bhowmik, D., Duraivel, S., and Umadevi, M. (2012). Traditional and medicinal uses of banana. *Journal of pharmacognosy and phytochemistry*, *1*(3), 51-63.

Kumar, V., Shukla, A. K., Sharma, P., Choudhury, B., Singh, P., and Kumar, S. (2017). Role of macronutrient in health. *World Journal of Pharmaceutical Research*, *6*(3), 373-381. https://doi.org/10.20959/wjpr20173-7955

Kumari, S. (2020). Black rice: an emerging 'super food'. Kumari, S. (2020). Black rice: an emerging 'super food'.

Lado, J., Cuellar, F., Rodrigo, M. J., and Zacarías, L. (2016). Nutritional composition of mandarins. In Nutritional composition of fruit cultivars (pp. 419-443). Academic Press.

Lin, X., Xu, B., and Pandohee, J. (2022). Plum and its products: properties and health benefits. In *Handbook of Plum Fruit* (pp. 229-247). CRC Press.

Lis, B., and Olas, B. (2019). Pro-health activity of dandelion (*Taraxacum officinale* L.) and its food products–history and present. *Journal of Functional Foods*, *59*, 40-48. https://doi.org/10.1016/j.jff.2019.05.012

Lister, C. E. (2015). Nutritional analysis of mushrooms-a summary. *A Plant & Food Research Report, Meadow Mushrooms Ltd., Kerala, India*.

López-Vargas, J. H., Fernández-López, J., Pérez-Álvarez, J. A., and Viuda-Martos, M. (2013). Chemical, physico-chemical, technological, antibacterial and antioxidant properties of dietary fiber powder obtained from yellow passion fruit (*Passiflora edulis* var. flavicarpa) co-products. Food Research International, 51(2), 756-763. https://doi.org/10.1016/j.foodres.2013.01.055

Malik, S. (2015). Pearl millet-nutritional value and medicinal uses. *International Journal of Advance Research and Innovative Ideas in Education*, *1*(3), 414-418.

Mandalari, G., Barreca, D., Gervasi, T., Roussell, M. A., Klein, B., Feeney, M. J., and Carughi, A. (2021). Pistachio nuts (*Pistacia vera* L.): Production, nutrients, bioactives and novel health effects. *Plants*, *11*(1), 18.

Mechchate, H., Es-Safi, I., Conte, R., Hano, C., Amaghnouje, A., Jawhari, F. Z., and Bousta, D. (2021). In vivo and in vitro antidiabetic and anti-inflammatory properties of flax (*Linum usitatissimum* L.) seed polyphenols. *Nutrients*, *13*(8), 2759. https://doi.org/10.3390/nu13082759

Meena, R. K., Kumari, M., Koli, G., and Meena, R. (2022). Leafy mustard: A healthy alternative to green vegetables. *J. Biotica Research Today*, *4*(5), 376-378.

Meenu, M., Chen, P., Mradula, M., Chang, S. K., and Xu, B. (2023). New insights into chemical compositions and health-promoting effects of black beans (*Phaseolus vulgaris* L.). *Food Frontiers*, *4*(3), 1019-1038. https://doi.org/10.1002/fft2.246

Mehta, S., and Taterway, D. (2024). A study on awareness and utilisation pattern of millet.

Miller, J. P., and Van Buiten, C. (Eds.). (2022). *Superfoods: Cultural and Scientific Perspectives*. Springer Nature.

Mohanapriya, M., Ramaswamy, L., and Rajendran, R. (2013). Health and medicinal properties of lemon (*Citrus limonum*). International Journal of Ayurvedic and Herbal Medicine, 3(1), 1095-1100.

Mohsin, A., Jabeen, A., Majid, D., Allai, F. M., Dar, A. H., Gulzar, B., and Makroo, H. A. (2020). Pineapple. *Antioxidants in fruits: Properties and health benefits*, 379-396. https://doi.org/10.1007/978-981-15-7285-2_19

Monk, J. M., Wu, W., Lepp, D., Wellings, H. R., Hutchinson, A. L., Liddle, D. M.,... and Power, K. A. (2019). Navy bean supplemented high-fat diet improves intestinal health, epithelial barrier integrity and critical aspects of the obese inflammatory phenotype. *The Journal of nutritional biochemistry*, *70*, 91-104. https://doi.org/10.1016/j.jnutbio.2019.04.009

Montero, L., Ballesteros-Vivas, D., Gonzalez-Barrios, A. F., and Sánchez-Camargo, A. D. P. (2023). Hemp seeds: Nutritional value, associated bioactivities and the potential food applications in the Colombian context. *Frontiers in nutrition*, *9*, 1039180. https://doi.org/10.3389/fnut.2022.1039180

Mudgal, D., Singh, S., and Singh, B. R. (2022). Nutritional composition and value added products of beetroot: A review. *Journal of Current Research in Food Science*, *3*(1), 01-09.

Mukherjee, P. K., Nema, N. K., Maity, N., and Sarkar, B. K. (2013). Phytochemical and therapeutic potential of cucumber. *Fitoterapia*, *84*, 227-236. https://doi.org/10.1016/j.fitote.2012.10.003

Murthy, K. N. C., Hepsiba, A., Jayaprakasha, G. K., and Patil, B. S. (2020). Grapefruit. In Nutritional Composition and Antioxidant Properties of Fruits and Vegetables (pp. 393-404). Academic Press.

Musara, C., Aladejana, E. B., and Mudyiwa, S. M. (2020). Review of the nutritional composition, medicinal, phytochemical and pharmacological properties of *Citrus reticulata* Blanco (Rutaceae). *F1000Research*, *9*, 1387.

Nadeem, M., Anjum, F. M., Khan, M. R., Saeed, M., and Riaz, A. (2011). Antioxidant potential of bell pepper (*Capsicum annum* L.)-A review. *Pakistan Journal of Food Science*, *21*(1-4), 45-51.

Nagraj, G. S., Chouksey, A., Jaiswal, S., and Jaiswal, A. K. (2020). Broccoli. In *Nutritional composition and antioxidant properties of fruits and vegetables* (pp. 5-17). Academic Press.

Nardi, G. M., Januario, A. G. F., Freire, C. G., Megiolaro, F., Schneider, K., Perazzoli, M. R. A., and Locatelli, C. (2016). Anti-inflammatory activity of berry fruits in mice model of inflammation is based on oxidative stress modulation. Pharmacognosy research, 8(Suppl 1), S42.

Naseri, E., Xiangyu, K., Hu, C., Ayaz, A., Rahmani, M. M., Nasim, M., and Hou, X. (2020). Bok-choy promotes growth performance, lipid metabolism

and related gene expression in Syrian golden hamsters fed with a high-fat diet. *Food & function*, *11*(3), 2693-2703. https://doi.org/10.1039/C9FO02975C

Nevedhitha, K. G., and Priya, K. L. (2022). Effect of pre-treatments on the quality of browntop millet flour and development of cookies. *Journal of Tropical Agriculture*, *60*(1).

Noreen, S., Tufail, T., Ul Ain, H. B., and Awuchi, C. G. (2023). Pharmacological, nutraceutical, and nutritional properties of flaxseed (*Linum usitatissimum*): An insight into its functionality and disease mitigation. *Food Science & Nutrition*, *11*(11), 6820-6829. https://doi.org/10.1002/fsn3.3662

Obadi, M., Sun, J., and Xu, B. (2021). Highland barley: Chemical composition, bioactive compounds, health effects, and applications. *Food Research International*, *140*, 110065. https://doi.org/10.1016/j.foodres.2020.110065

Oke, O. S., Oyaniyi, T., Adewumi, O. T., Bamigboye, O. T., Lawah, M. O., Jatto, K. A., and Ogunbela, A. A. (2020). Economic, nutritional and medicinal values of African walnut (*Tetracarpidium conophorum*) in Nigeria (Hutch. & Dalziel): A review. *Journal of Research in Forestry, Wildlife and Environment*, *12*(2).

Okechukwu-Ezike, N., Munonye, J., and Esiegwu, A. (2020). Comparative evaluation of the proximate composition, anti-nutrients and functional properties of some underutilized pulses. *Food Science and Quality Management*, *95*, 72-76. https://doi.org/10.7176/fsqm/95-08

Phonphoem, W., Sinthuvanich, C., Aramrak, A., Sirichiewsakul, S., Arikit, S., and Yokthongwattana, C. (2022). Nutritional profiles, phytochemical analysis, antioxidant activity and DNA damage protection of makapuno derived from Thai aromatic coconut. *Foods*, 11(23), 3912. https://doi.org/10.3390/foods11233912

Pinela, J., Carvalho, A. M., and Ferreira, I. C. (2020). Watercress. In *Nutritional Composition and Antioxidant Properties of Fruits and Vegetables* (pp. 197-219). Academic Press.

Pokorny, J., Yanishlieva, N., and Gordon, M. H. (Eds.). (2001). *Antioxidants in food: practical applications*. CRC press.

Poutanen, K., Katina, K., and Heiniö, R. L. (2014). Rye. *Bakery products science and technology*, 75-87. https://doi.org/10.1002/9781118792001.ch4

Price, C. T., Langford, J. R., and Liporace, F. A. (2012). Essential nutrients for bone health and a review of their availability in the average North American diet. *The open orthopaedics journal*, *6*, 143.

Proestos, C. (2018). Superfoods: Recent data on their role in the prevention of diseases. *Current Research in Nutrition and Food Science Journal*, *6*(3), 576-593.

Raiger, H. L., and Jajoriya, N. K. (2023). Grain amaranth: Naturally gluten-free superfood grain. *Indian Farming*, *73*(3), 24-27.

Rajeshwari, U., and Andallu, B. (2011). Medicinal benefits of coriander (*Coriandrum sativum* L). *Spatula DD*, *1*(1), 51-58. https://doi.org/10.5455/SPATULA.20110106123153

Ramaiyan, B., Kour, J., Nayik, G. A., Anand, N., and Alam, M. S. (2020). Spinach (*Spinacia oleracea* L.). *Antioxidants in vegetables and nuts-Properties and health benefits*, 159-173.

Rani, J., Kaur, P. and Chuwa, C., 2023. Nutritional benefits of herbs and spices to the human beings. *Annals of Phytomedicine An International Journal*, *12*(1), pp.187-197.

Rasheed, R. B., Hussain, S., and Syed, S. K. (2021). Phytochemistry, nutritional and medicianl value of kiwi fruit. PostepyBiologiiKomorki, 48(2), 147-165.

Ren, F., and Zhou, S. (2021). Phenolic components and health beneficial properties of onions. *Agriculture*, *11*(9), 872. https://doi.org/10.3390/agriculture11090872

Rishitha, P., and Soni, D. (2024). Finger millet: Nutritional profile and potential health benefits. *Res. Jr. Agril. Sci*, *15*(1), 153-158.

Roberts, J. L., and Moreau, R. (2016). Functional properties of spinach (*Spinacia oleracea* L.) phytochemicals and bioactives. Food & function, 7(8), 3337-3353.

Ru, R., Guo, Y., Mao, J., Yu, Z., Huang, W., Cao, X., and Yuan, L. (2022). Cancer cell inhibiting sea cucumber (*Holothuria leucospilota*) protein as a novel anti-cancer drug. *Nutrients*, *14*(4), 786.

Saleh, B. K., Omer, A., and Teweldemedhin, B. J. M. F. P. T. (2018). Medicinal uses and health benefits of chili pepper (Capsicum spp.): a review. *MOJ Food Process Technol*, *6*(4), 325-328. https://doi.org/10.15406/mojfpt.2018.06.00183

Šamec, D., Urlić, B., and Salopek-Sondi, B. (2019). Kale (*Brassica oleracea* var. acephala) as a superfood:

Review of the scientific evidence behind the statement. *Critical reviews in food science and nutrition*, 59(15), 2411-2422. https://doi.org/10.1080/10408398.2018.1454400

Santoso, P., Maliza, R., Insani, S. J., Fadhila, Q., and Rahayu, R. (2021). Preventive effect of jicama *(Pachyrhizus erosus*) fiber against diabetes development in mice fed with high-fat diet. *Journal of Applied Pharmaceutical Science*, *11*(1), 137-143.

Sarker, M. M. R. (2021). Evaluation of red and green colored bell peppers for the production of polyclonal IgM and IgG antibodies in murine spleen cells. *Bangladesh Pharmaceutical Journal*, 24(1), 45-53. https://doi.org/10.3329/bpj.v24i1.51635

Satheesh, N., & Workneh Fanta, S. (2020). Kale: Review on nutritional composition, bio-active compounds, anti-nutritional factors, health beneficial properties and value-added products. *Cogent Food & Agriculture*, *6*(1), 1811048.

Shah, T., Bule, M., and Niaz, K. (2019). Goji Berry (*Lycium barbarum*)—A superfood. In *Nonvitamin and Nonmineral Nutritional Supplements* (pp. 257-264). Academic Press. https://doi.org/10.1016/B978-0-12-812491-8.00037-0

Shanmugam, H., Jayaprakasha, G. K., and Patil, B. S. (2018). Extraction and identification of health-promoting phytochemicals from Brussels sprouts. In *Advances in plant phenolics: from chemistry to human health* (pp. 151-174). American Chemical Society. https://doi.org/10.1021/bk-2018-1286.ch008

Shirai, Y., Fujita, Y., Hashimoto, R., Ohi, K., Yamamori, H., Yasuda, Y., and Hashimoto, K. (2015). Dietary intake of sulforaphane-rich broccoli sprout extracts during juvenile and adolescence can prevent phencyclidine-induced cognitive deficits at adulthood. *PLoS One*, *10*(6), e0127244. https://doi.org/10.1371/journal.pone.0127244

Silva Dias, J. C. (2014). Nutritional and health benefits of carrots and their seed extracts. *Food and Nutrition Sciences*, *5*(22), 2147.

Silva, H. C., and Luh, B. S. (1979). Changes in oligosaccharides and starch granules in germinating beans. *Canadian Institute of Food Science and Technology Journal*, *12*(3), 103-107.

Singh, A., Gupta, A., and Sharma, S. (2021). Kidney beans: Nutritional properties, biofunctional components, and health benefits. In *Handbook of cereals, pulses, roots, and tubers* (pp. 357-376). CRC Press.

Singh, M. P., Soni, K., Bhamra, R., and Mittal, R. K. (2022). Superfood: Value and need. *Current Nutrition & Food Science*, *18*(1), 65-68.

Siyuan, S., Tong, L., and Liu, R. (2018). Corn phytochemicals and their health benefits. *Food Science and Human Wellness*, *7*(3), 185-195. https://doi.org/10.1016/j.fshw.2018.09.003

Srilekha, K., Kamalaja, T., Uma Maheswari, K., &Neela Rani, R. (2019). Nutritional composition of little millet flour. *International Research Journal of Pure and Applied Chemistry*, *20*(4), 1-4.

Srivastava, A.K., Kothawale, D.R., Rajeevan, M.N. (2017). Variability and Long-Term Changes in Surface Air Temperatures Over the Indian Subcontinent. In: Rajeevan, M., Nayak, S. (eds) Observed Climate Variability and Change over the Indian Region. Springer Geology. Springer, Singapore. https://doi.org/10.1007/978-981-10-2531-0_2

Syed, F., Arif, S., Ahmed, I., and Khalid, N. (2021). Groundnut (peanut) (*Arachis hypogaea*). *Oilseeds: health attributes and food applications*, 93-122. https://doi.org/10.1007/978-981-15-4194-0_4

Tacer-Caba, Z. (2019). The concept of superfoods in diet. In *The role of alternative and innovative food ingredients and products in consumer wellness* (pp. 73-101). Academic Press.

Tang, D., Dong, Y., Ren, H., Li, L., and He, C. (2014). A review of phytochemistry, metabolite changes, and medicinal uses of the common food mung bean and its sprouts (*Vigna radiata*). *Chemistry Central Journal*, *8*, 1-9.

Tongjaroenbuangam, W., Ruksee, N., Chantiratikul, P., Pakdeenarong, N., Kongbuntad, W., and Govitrapong, P. (2011). Neuroprotective effects of quercetin, rutin and okra (*Abelmoschus esculentus* Linn.) in dexamethasone-treated mice. *Neurochemistry international*, *59*(5), 677-685. https://doi.org/10.1016/j.neuint.2011.06.014

Toulabi, T., Yarahmadi, M., Goudarzi, F., Ebrahimzadeh, F., Momenizadeh, A., and Yarahmadi, S. (2022). Effects of flaxseed on blood pressure, body mass index, and total cholesterol in hypertensive patients: A randomized clinical trial. *Explore*, *18*(4), 438-445.

Varma, P., Bhankharia, H., and Bhatia, S. (2016). Oats: A multi-functional grain. *Journal of Clinical and Preventive Cardiology*, *5*(1), 9-17.

Venkateish, V. P., Vani, V., Nivya, V., Baskaran, V., and Madan, K. P. (2021). Bioactives of Lactuca sativa: nutritional and clinical importance. *Advances in health and disease*, *33*.

Vieira, E. F., Pinho, O., Ferreira, I. M., and Delerue-Matos, C. (2019). Chayote (*Sechium edule*): A review of nutritional composition, bioactivities and potential applications. *Food chemistry*, *275*, 557-568. https://doi.org/10.1016/j.foodchem.2018.09.146

Volk, G. M., and Henk, A. D. (2016). Historic American apple cultivars: identification and availability. *Journal of the American Society for Horticultural Science*, *141*(3), 292-301. https://doi.org/10.21273/JASHS.141.3.292

Walia, A., Kumar, N., Singh, R., Kumar, H., Kumar, V., Kaushik, R., and Kumar, A. P. (2022). Bioactive compounds in Ficus fruits, their bioactivities, and associated health benefits: a review. *Journal of Food Quality*, 2022(1), 6597092. https://doi.org/10.1155/2022/6597092

Xie, T., Wu, Q., Lu, H., Hu, Z., Luo, Y., Chu, Z., and Luo, F. (2023). Functional Perspective of Leeks: Active Components, Health Benefits and Action Mechanisms. *Foods*, *12*(17), 3225. https://doi.org/10.3390/foods12173225

Xu, Y., Cartier, A., Kibet, D., Jordan, K., Hakala, I., Davis, S., and Rutto, L. (2016). Physical and nutritional properties of edamame seeds as influenced by stage of development. *Journal of Food Measurement and Characterization*, *10*, 193-200. https://doi.org/10.1007/s11694-015-9293-9

How to cite this article:

Jyoti Rani, Sakshi Saini and Hitashi Jain. 2024. Health and Nutritional Benefits Provided by Superfoods: A Review. *Int.J.Curr.Microbiol.App.Sci.* 13(7): 106-132. **doi:** https://doi.org/10.20546/ijcmas.2024.1307.013