

Black Soyabeans: Polyphenol and Health Benefits

Rahul Arora

Department of Pharmacy

Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

ABSTRACT: Polyphenols are secondary plant metabolites with antioxidant benefits that makes defend chronic diseases from damage caused by free radicals. Because of their potential beneficial health effects, dietary polyphenols are the focus of growing interest to scientists. There has been further research in the possible health advantages of dietary polyphenols as antioxidants in the last two decades. Black soybeans are simply a black soybean variant that includes a number of phytochemicals. This black soybean (BSB) phytochemicals are theoretically useful for human wellbeing, including cancer, asthma, respiratory, cerebrovascular, and neurodegenerative diseases. The present analysis attempts to include up-to-date evidence on BSB's health effects, taking into consideration the experimental study, which seeks to explore their medicinal potential for potential medical practice. A library archive and electronic search were used to gather all data from in vitro and in vivo BSB findings and their effects on human health (Science Direct, PubMed, and Google Scholar). In a fitting location on the report, the various pharmacological data was compiled and arranged.

KEYWORDS: Black Soybeans (BSB), Cardiovascular, Cancer, Diabetes, Polyphenols.

INTRODUCTION

Phytochemicals, primarily found in bananas, vegetable, tea, coffee, chocolate, legume, cereals, and drinks, are polyphenols. In nature, more than 8000 polyphenols are known and their key roles are as antioxidants. They defend our bodies from free radical disruption and defend it from UV radiation or pathogenic violence. There has been further research in the possible health advantages of dietary polyphenols as antioxidants in the last two decades. The typical fresh fruit volume of 100 grammes (grapes, apples, pears, cherries and berries) contains up to 300 mg of polyphenols. Usually, there are more than 100 mg of polyphenols in a cup of tea or coffee or a bottle of red wine. In contrast, the polyphenolic consumption also applies to cereals, fruits, dried legumes and chocolate and thus prevents our body from chronic diseases. Because of their potential beneficial effects on human health, dietary polyphenols are the focus of growing scientific interest. These are generally offered as colour, spice, bitter, and astringent to the food, and retain oxidation stability. Many other epidemiological research and related meta-analyses have demonstrated that the ingestion of these polyphenols offers stronger protections towards infectious diseases like tumour, coronary disease, cerebrovascular disease, asthma, ageing and neurodegenerative disease[1][2].

Types of Polyphenols

Depending on the existence of a variety of phenolic groups and structural components, polyphenol are classified into four distinct types. Food typically contains complex polyphenol, mostly present in the plants' outermost layer.

1. Flavonoids: Have a possible effects on allergic reactions and radical scavenging. Fruits, herbs, legumes, red wine, and green tea are primarily found in them. A variety of subtypes have been further classified into flavone, flavonol, flavanone, isoflavone, anthocyanidin, chalcone, and catechin.

2. Stilbenes: included in grapes, red wine, and peanut goods. A very well compounds in the group is resveratrol.
3. Lignans: Present in seeds such as flax, linseed, legumes, nuts, cereals, berries, algae, plants, etc.
4. Phenolic acids: Present in chocolate, tea, cocoa, blueberries, kiwi, plum, apple, which cherries, and also have two subgroups: hydroxybenzoic acid and hydroxycinnamic acid[3].

Role of Polyphenols in Plants and Humans

Polyphenols in the plant guard against UV radiation, bacteria, oxidative stress, and extreme environmental conditions. Polyphenols are antioxidants in the human body that have different biochemical effects, like anti-diabetics, anti-cancer, anti-inflammatory, cardio protective, osteo protective, anti-asthmatic, anti-hypertensive, anti-aging, anti-septic, cerebrovascular, cholesterol lowering, hepatoprotective, anti fungal, anti bacterial and anti viral.

Black Soybeans

Soybeans include multiple seed coat colours, such as black, yellow, green, and brown. It is due to anthocyanins, chlorophyll, and other pigments that are present. For hundreds of years in Asia, black soybeans (BSB) have been extensively eaten as food and as materials for Oriental medicine. The black pigmentation is attributed to anthocyanin aggregation in the seed coat's epidermis palisade sheet. Specific anthocyanins, include cyanidin-3-glucoside, delphinidin-3-glucoside, and pelargonidin-3-glucoside have been found in BSB. For infection health promotion and prevention, BSB is an outstanding dietary source. Isoflavones and proteins are the key health-beneficial elements of BSB that have gained recognition in the last 2 decades. Nonetheless, there is inadequate evidence to describe the medical benefits relevant to BSB. They have effective anticancer phytochemicals that are potentially useful for human wellbeing and the treatment of multiple chronic diseases, such as isoflavones, sterols, phytic acid, saponins, and phenolics. Analysis has shown that, relative to other coloured soybeans, BSB has the largest antioxidant properties. The presence of phenolics that are primarily dispersed in the seed coat is responsible for the characteristic antioxidant capacity[4].

DISCUSSION

Nutritional Importance of BSB

BSB (32-43.6 percent) has a high protein content. BSB includes carbohydrates (31.7-31.85 percent), lipids (15.5-24.7 percent), water (5.6-11.5 percent), minerals (calcium, phosphorous, magnesium, potassium, sodium, selenium, etc.) and vitamin, in form of protein (Vitamin E, B complex, etc.). The lipid content of the BSB consists of 86% unsaturated fatty acids, particularly linoleic (6.48-11.6%), linolenic (0.72-2.16%) and oleic acid (3.15-8.82%), rendering it advantageous for human health. Soybeans are distinguished by lysine and methionine, the most digestible proteins. It is, nevertheless, constrained by tryptophan and sulphur amino acids[5].

Enhance Bone Stability

BSB has an elevated protein and fibre content. It has an overwhelming minerals and vitamins that help sustain and strengthen the bone and its durability, such as calcium, phosphorous

magnesium, iron, manganese, copper, and zinc. The study found that in the postmenopausal osteoporosis research framework, BSB intake had a definite preventive impact on bone degradation, thus inhibiting bone turnover and avoiding bone resorption. This research verified that BSB intake can be used to reduce bone degradation in animal experiments involving oestrogen deficiency. In contrast, retrospective and acute clinical study trials have also indicated that isoflavone-genistein in postmenopausal osteopenic females decreases bone degradation and increases bone mineral density[6].

Reduce Blood Pressure

BSB has become a subject of extensive study because of the positive health impact on the human cardiovascular system. BSB contains a low sodium concentration that helps preserve a reasonable levels of blood pressure. A recent clinical research has also demonstrated that BSB, abundant in anthocyanins, decreases the risk of cardiovascular disorders and regulates the blood pressure of the persons influenced. In fact, BSB has strong collagen-induced platelet aggregation inhibitory activity and decreases cardiovascular risk, thus improving blood circulation. There are large concentrations of fibre, calcium, folic acid, pyridoxal phosphate and phytonutrients (quercetin and saponins) in BSB, and there is a shortage of cholesterol to help prevent cardiovascular risks. The fibre in BSB helps decrease the risk of cardiovascular disease by reducing total cholesterol (TC), LDL-cholesterol (LDL-C) in the blood and liver. By - antioxidant activity and optimising lipid profiles, it reduces oxidative stress in postmenopausal people[7].

Reduce Cardiovascular Complications

BSB intake can decrease the risk of cardiovascular disease. Latest evidence has shown that BSB inhibits low-density lipoprotein oxidation, inhibits vascular cell adhesion molecule-1 (VCAM) mediated TNF-alpha, intracellular adhesion molecule-1 (ICAM) and cyclooxygenase-2 levels. In addition, anthocyanins have prevented myocardial damage in rats from ischemia-reperfusion. Thus, BSB seed coat anthocyanins profit from pathological conditions such as coronary heart disorders[8].

In Managing Diabetes

BSB is found in high concentrations in anthocyanins, and they've been eaten for their potential health benefits since prehistoric times. The BSB seed coat has been reported to be able to enhance obesity and insulin resistance. There are more BSB fibres, which play a crucial function in lowering blood sugar. Notably, one cup of BSB contains about 15 g of fibre. In addition, the BSB seed coat extract contains food content rich in polyphenol consisting of 9.2% cyanidin 3-glucoside, 6.2% catechin, 39.8% procyanidin, and others. By increasing energy consumption and stimulating inflammation, these substances surprisingly avoid diabetes and obesity[9].

Cancer Prevention

Many research findings have shown that BSB-rich anthocyanins have been shown to suppress the growth of cancerous cells by resisting oxidative stress and inflammatory responses. BSB seed coat extract rich in anthocyanin may decrease the advancement of tumours in different organs, including the intestines, breast, prostate, abdomen, ovary, endometrium, and liver. Saponins, in addition to anthocyanins, also inhibit the growth and dissemination of cancer cells

across the body. BSB is rich in folic acid, that plays a critical role in the production and restoration of DNA, thereby preventing the development of DNA mutations in cancerous cells[10].

Reduce Body Weight

BSB provides large concentrations of fibres that increase satiety and decreases hunger, make a person feel satisfied for longer periods of time, and thereby decrease the total intake of calories. Several research has suggested that intake of anthocyanin-rich BSB decreases the risk of subcutaneous and overall mortality from adipogenic activity, obesity, fatty acid content, while encouraging healthier skin, visceral fat, increased vitality, and overall reduction of body weight.

Antimicrobial Actions

BSB-rich anthocyanins could have antimicrobial, anti-fungal, and anti-viral characteristics. The BSB extract provided a substantial reduction in the growth rate of foodborne pathogens such as *Escherichia coli*, *Salmonella typhimurium* and *Campylobacter jejuni* in broth and chicken skin cultures. An independent monomeric protein (25 kDa molecular mass), comprising an N-terminal sequence resembling a fragment of chitin synthase, was also seen in a previous review. Strong antifungal action against *Fusarium oxysporum* and *Mycosphaerella arachidicola* and antiviral ability against HIV-1, human adenovirus type 1 and coxsackievirus B1 are shown by the protein called glysojanin[11].

CONCLUSION

Black soybeans has traditionally being commonly used at a cheap price as a nutritional and medicinal material. The antioxidant activity of anthocyanins may be helpful for the management of asthma, cardiovascular diseases, tumours, etc. While it remains important to better understand the exact process through which anthocyanins inhibit the expression of adhesion molecules, these can be used as good materials to modulate or avoid certain chronic diseases. In any event, more support has been gained from cellular and molecular research for certain properties/dynamic constituents, although medical trials are still insufficient. Extra clinical trials are warranted in recognising the full explanation of the results of anthocyanins in BSB for human disease control, provided that animal testing doesn't really necessarily view human circumstances. Subsequently, the medicinal convenience of anthocyanins in BSB is warranted by potential far-reaching clinical trials. In addition, a proposal for further trials, and also research of the mode of action and novel biomarkers to show the efficacy of BSB bioactive compounds in avoiding and treating multiple symptoms and/or pathologies, will be to illustrate the synergistic multi-component effects of BSB on biological processes.

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