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Pumpkin Seeds as a Power House of Nutrition: A Review

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Abstract

Today the need to obtain nutritious foods from new sources and lower in waste food processing industry has created a high interest. Modification of agro industrial waste products into valuable elements is probably a huge footstep towards the direction of food sustainability. Pumpkin seeds (Cucurbita sp.) are commonly regarded as agro-industrial waste and discarded. However, pumpkin seeds are high in amino acids, phytosterols, unsaturated fatty acids, phenolic compounds, tocopherols, cucurbitacins, and essential minerals, among other nutrients and nutraceuticals. All of these bioactive substances are essential for living a healthy and happy life. The present study aims at reviewing the various researches done in the past on the uses of the pumkin seed for the treatment of digestion problems, diarrhoea, colic, dyspepsia etc. Various researcher investigated that the used of pumpkin seed are beneficial for some diseases such as diabetes, alzheimer, anti cancer, hypercholesterolemic and hypertension patients. Pumpkin seeds has wide application, as antimicrobial, antioxidant, insecticidal, encapsulation, antifungal. As from all the studies, that done and concluded that pumpkin seed have be used as functional food for humans by combine with unit operations of food processing for treatment of various ailments.

Keywords: Pumpkin; Seeds; Nutraceuticals; Phytosterols; Tocopherols etc.

Introduction

The need to obtain nutritious meals from new sources while reducing waste in the food processing business has sparked a lot of interest. Modification of agro industrial waste products into valuable elements is perhaps an enormous footstep towards the direction of food sustainability. Pumpkin seeds (Cucurbita sp.) are commonly regarded as agro industrial waste and discarded. Pumpkin seeds (Cucurbita sp.) from the Cucurbitaceae family are commonly regarded as industrial waste and discarded. In some areas of India seeds are consumed as cooked or roasted as a fibre source with a pumpkin. The seeds are considered as byproduct of the pumpkin fruit, they're cheaper in cost and their utilization is different food products may cause enhance their nutritional value at lower cost. Various health promoting impacts of pumpkin seeds on the extent of blood sugar, cholesterol, immunity, liver functioning, gallbladder, disabilities of leaning, prostate, depression, inflammation, cancer management and inhibition of parasites were widely seen. This review examines the functional (or nutraceutical) qualities of pumpkin seeds in relation to molecular roles in order to

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determine its promising potential as a functional food ingredient, identify gaps, and provide a technical foundation and direction for future research.

Nomenclature

Pumpkins (Cucurbit sp.) of the Cucurbitaceae family are widely farmed as a vegetable all over the world. There are many varieties of pumpkin such as Cucurbita maxima, Cucurbita pepo, Cucurbita moschata, Cucurbita ficifolia, Cucurbita turbaniformis and Cucurbita moschata (Gemrot, et al., 2006). Pumpkin seeds are edible seeds of pumpkin fruit. These flat and white seeds are a 'Powerhouse of Nutrition'. They are somewhat oval in shape and after removing the outer white cover, light greenish seeds are obtained.

Although the pumpkin itself has various benefits, the pumpkin seeds have been. Pumpkin belongs to genus Cucurbita of the family Cucurbitaceae. Pumpkin seeds, commonly known as 'pepitas', are flat, encased in yellow-white husk. Pumpkin seeds are wealthy in medicinal and nutritive components, because of which motive they're carried out in healing functions throughout the globe. Food is certainly considered one among our maximum simple needs, which gives us strength for the entirety we do and additionally for all involuntary features of our inner organs. Pumpkins are grown everywhere in the global for numerous motives starting from agricultural functions (animal feed) to business and decorative sales.

Pumpkins (Cucurbit sp.) belonging to the Cucurbitaceae family are grown widely round the world as a vegetable. There are many sorts of pumpkin like Cucurbita maxima, Cucurbita pepo, Cucurbita moschata, Cucurbita ficifolia, Cucurbita turbaniformis and Cucurbita moschata (Gemrot, et al., 2006). Pumpkin seeds are edible seeds of pumpkin fruit. These flat and white seeds are a 'Powerhouse of Nutrition'. they're somewhat oval in shape and after removing the outer white cover, light greenish seeds are obtained.

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Structure of Plant

Pumpkin plant is a perennial plant with leafy green vegetable and has a climbing stem of up to 12m long. Pumpkin have a thick, orange or yellow shell, creased from the stem to bottom and contains seeds and pulp. Pumpkin plants are hardy creepers or soil surface runners, but also climb wherever the supports are present (Fig. 1a). Pumpkin seeds are versatile in nature in their uses and most parts of pumpkin seeds are edible, including the fleshy shell, seeds, leaves and even the flowers.

Pumpkin plant is a perennial plant with leafy green vegetable and has a hiking stem of as much as 12m long. Pumpkin have a thick, orange or yellow shell, creased from the stem to backside and carries seeds and pulp. Ripe pumpkin fruit are often boiled, baked, steamed or roasted. Pumpkins are consumed during a sort of ways like fresh or cooked vegetables, aswell as being stored frozen or canned (Figueredo et al., 2000). Pumpkin also can be processed into flour which features a longer time period and is employed thanks to its highly desirable flavor, sweetness and deep yellow orange color. Some researchers investigated that pumpkin flour has been wont to supplement cereal flours in bakery products, soups, sauces, instant noodles and spice also as a natural coloring agent in pasta, flour mixes and desserts. Pumpkin seeds are popular snack which will be found hulled/semi hulled. Pumpkin seeds are fried and salted and are available within the market under the name of 'pepitos'. Fluted pumpkins seed flour has been used as a protein supplement during a sort of local foods (Giami and Bekebain, 1992).

Fig.1: (a) Pumpkin plant (b) Pumpkin Fruit (c) Pumpkin Seed.

Nutritional Value of Pumpkin Seeds

Pumpkin seeds have many health benefits, a number of which include an honest source of proteins, vitamins, and minerals. One gram of pumpkin seed protein contains the maximum amount tryptophan as a full glass of milk. Pumpkin seeds are highly nutritional and rich nutraceutical components like unsaturated fatty acids especially hexadecanoic acid, octadecanoic acid, monounsaturated fatty acid and

linolic acid (Stevenson, et al., 2007).

These essential fatty acids belong to the w6 and w3 families, perform amazing nutritional functions and play important roles in many metabolic pathways (Miura, 2013). Pumpkin seeds oil contains rich vitamin E like a-tocopherol and g-tocopherol that exhibited positive health effects (Rabrenovic, et al., 2014).

Murkovic et al. (2003) investigated that the nutritional value of pumpkin seeds increases after roasting. Pumpkin seeds are rich in protein content (25-52%) (Bombardelli and Morazzoni, 1997). Nakiæ et al. (2006) reported that oil content is also high, ranging from 40-60%. Out of this, up to 60.8% is contributed from fatty acids oleic acid (up to 46.9%), linolenic acid (up to 40.5%), palmitic and stearic acid up to 17.4%, the ratio of monounsaturated to polyunsaturated acids from 0.60 to 0.75g. The fatty acids in pumpkin seeds contain a range of beneficial nutrients, such as sterols, squalene, and tocopherols. Approximately 1% each of phytosterols, squalene and chlorophyll pigment are present. Phytosterols are present in free and bound form. Bombardelli and Morazzoni, (1997) investigated proteins (25-52%), minerals (including selenium, zinc, calcium, copper, iron, manganese, phosphorus and potassium) are present 4-5% and pectin content is 30% .

The physical properties, chemical composition and fatty acid proportion was determined by an investigator and his collogues they found that pumpkin seeds contained 41.59% oil, 25.4% protein, 5.2 % Moisture, 25.19% carbohydrates, 5.34% fiber, and 2.49% total ash. Total phenolic compounds, total sterols, waxes and total tocopherols were 66.25 (mg galic acid per kg oil), 1.86%, 1.56% and 882.65 (mg tocopherol per kg oil) respectively. Active constit uents of pumkin seeds Amino acids Alanine, Arginine, Cystein, Glycine, Histidine, Isoleucine, Lycine, Tryptophan (Glew et al., 2006) Cucurbitin (Chopra et al., 1956) Essential fatty acids α-Linolenic acid, Oleic Acid, Palmitic Acid And Stearic Acid, Linoleic Acid (The Wealth of India, 2004) Minerals Zinc, Selenium, Manganese (Glew et al., 2006) Vitamins Tocopherol (Stevenson et al., 2007).

Table 1: USDA National Nutrient Database of Nutrients.

Components	Nutrient Value
Energy	559 kcal
Carbohydrates	10.71 g
Protein	30.23 g
Total fat	49.05 g
Cholesterol	0 mg
Dietary fibre	6 g

Table 2: USDA National Nutrient Database of Vitamins.

Vitamins	Quantity
Folate	58 µg
Niacin	4.987 mg
Pantothenic acid	0.750 mg
Pyridoxine	0.143 mg
Riboflavin	0.153 mg
Thiamine	0.27 mg
Vitamin A	16 IU
Vitamin C	1.9 µg
Vitamin E	35.10 mg

Table 3: USDA National Nutrient Database of Minerals.

Minerals	Quantity
Sodium	7 mg
Potassium	809 mg
Calcium	46 mg
Copper	1.343 mg
Iron	8.82 mg
Magnesium	592 mg
Manganese	4.543 mg
Phosphorus	1,233 mg
Selenium	9.4 µg
Zinc	7.81 mg

Bioactives compounds in pumpkin seeds

Many researcher reported different bioactives compounds in pumkin seeds which were Carotenoids Lutein, β-Carotene (Parry et al., 2007) Phytosterol β-Sitosterol (Haas et al., 2006) Glycosides Saponin (Chopra et al.,1956) Phytoestrogens Lignan (Slavin et al.,1999) Triterpene Squalene (Ryan et al., 2007). Pumpkin (Cucurbita pepo) has received considerable attention in recent years because of the nutritional and health protective values of the seeds. The seed is an superb source of protein and also has pharmacological activities like anti-diabetic, antifungal, antibacterial, anti inflammation activities and antioxidant effects (Nkosi et al., 2006). Besides, the pumpkin is economical and a nutrient dense source, the pumpkin seed flour fortified complementary food mix is economical, with highly acceptable sensory qualities and a rich nutritive value (Dhiman, 2009).

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Table 4: USDA National Nutrient Database of Phytonutrients.

Phytonutrients	Quantity
Carotene-b	9 µg
Cryptoxanthin-b	1 µg
Lutein–zeaxanthin	74 µg

Latest Medicinal Uses

Pumpkin seed oil (PSO) is commonly used in folk medicine. Hypertension, atherosclerosis, prostatic hypertrophy, and urinary bladder hyperplasia were all reduced in those who consumed the seed oil on a regular basis in many nations. In Eritrea, pumpkin seeds are also used to treat tapeworms (Harvath, 1988; Schiebel Schlosser and Fruehwirth 1998; Zuhair et al., 2000, Dreikorn, 2002). Essential fatty acids (FAs), vitamins, squalling, carotenoids, tocopherols, phytoestrogens, phytosterols, polyphenols, hydrocarbons, triterpenoids, and selenium are just a few of the antioxidants and nutritional supplements found in PSO (Zambo, 1988; Murkovic et al., 1996; Fruehwirth and Hermetter, 2007; Gossell Williams, 2008).

Table 5: Latest medicinal research by different researchers.

Author/Year	Study
Mahasneh and El Oqlah, 1999; EI-Aziz and EI-Kalek, 2011	Pumpkin seeds have been used as an antihelminthic agent and for supportive treatment in functional disorders of the bladder.
Abuelgassim and Al-Showayman, 2012	Reported cholesterol lowering effect of pumpkin seeds could be due to high concentrations of phytosterols.
El-Mosallamy et al., 2012	Pumpkin seeds contain tryptophan which might be responsible for exerting blood-pressure lowering effect.
Behrooz et al., 2013	The ?-tocopherol present in pumpkin seed possesses anti-inflammatory properties and can be used to treat arthritis and other conditions which cause painful swelling.

Functional food and technical developments

Norfezah et al. (2013) investigated the effect of incorporation of flour from the three different fractions (peel, flesh and seed) of Crown pumpkin (C. maxima). The flour was incorporated into an extruded snack formulation at various levels and processed in a twin screw extruder to make ten expanded snack products. Inclusion of the peels and seeds at 10 % yielded extruded products with similar expansion and density characteristics to the control sample; however, an inclusion of greater than 10 % led to hardness of the product.

Naghii and Mofid studied the effect of consumption of iron-fortified ready to eat cereal (30 g providing 7.1mg iron/day) and pumpkin seed kernels (30 g providing 4.0mg iron/day) for 4 weeks. After the consumption period, there was a better response to iron as indicated by a higher serum iron level. Young children, adolescents, women of reproductive ages and pregnant women who are often susceptible to iron deficiency-caused anaemia could also be benefitted.

In the recent years, pumpkin seeds have an outsized range of application as a food or herbal medicine. Those waste streams are valuable and may be utilized for food products and/or nutraceutical products. They will be consumed as a snack, salads or breakfast cereal within the roasted form (salted or not). Additionally, they might be utilized in baking because the excellent ingredients of bread or cakes. Moreover, their oil is superb and will gain acceptance as edible oil and additive component in food, pharmaceutical and cosmetic industries. Pumpkin seeds oil is beneficial for frying, cooking, baking and dressing. Supplement from pumpkin seeds might be developed within the sort of a soft capsule. In cosmetic industries, they typically use for skin care products like antiaging, free radical scavenging, skin protection and hair care products like hair growth stimulants and emollients. The consumption of pumpkin seeds within the oil form or roasted pumpkin seeds is proved to exhibit several positive health effects.

Future perspective

The findings above confirm that pumpkin seed not only is delicious food, but also possesses therapeutic values. There are several cultivars of pumpkins, but thus far only C. pepo, C. maxima and C. moschata are studied. Nutritional evaluation of other seed varieties and selection of high-yield varieties may open up new possibilities for formulating food products. With sufficient investigative focus, it's going to emerge as a substitute to edible seed or a complement to flaxseed. Pumpkin seed oil might be an alternate to the expensive vegetable oil. The optimal use of this nutrition dense seeds must tend due attention, for it could address the food security issue to a big degree.

Conclusion

The conclusion of this literature review is that pumpkin seeds have novel bioactive compositions that support human health and life. All of those findings bring us to the new idea in developing and innovating functional foods from pumpkin seeds for the massive range application. There are three main types are cultivated like pumpkin, Cucurbita maxima and winter crookneck. The nutrient composition analysis of pumpkin seeds showed that these are very nutritious and supply many essential nutrients for health. However, the pumpkin seeds are used for medicinal purpose and these possess also nutritional and therapeutic importance. The pumpkin seeds play a big role in providing of micronutrients and also utilized in treatment and management of diabetes, inflammation, hyperlipidaemia, hypertension, cancer management and protect heart etc. (Kalogropoulos, 2013). These pumkin seeds contributes to food sector, nutrition, dietary and culinary diversification, health and income generation. The aim of this review was to debate various medicinal and nutritional properties of pumpkin seeds which will further impact many research developments and further can prove as a possible source of functional foods. (Obregón, Lozano and Zúñiga, 2004).

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