World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

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A Review on Nutritional, Physical and Health-Promoting Properties of Beetroot (*Beta Vulgaris)*

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World Journal of Advanced Research and Reviews, 2026, 29(01), 591-594

Publication history: Received 27 October 2025; revised on 06 December 2025; accepted on 08 December 2025

Article DOI: https://doi.org/10.30574/wjarr.2026.29.1.4091

Abstract

Beetroot (*Beta vulgaris*) is an important and functional food which is consumed all around the world. It has diverse nutritional and phytochemical composition, with increasing potential health benefits. A beetroot is a vegetable notable for its intense pigmentation and nutritional profile that has emerged as a multifunctional crop across culinary, agricultural, and biomedical domains. Its primary bioactive compounds like nitrates, betalains, and polyphenols contribute to antioxidant capacity, it has beneficial for improving hemoglobin levels and preventing anemia, enhances blood flow, supports cardiovascular health, and helps lower blood pressure. Additionally, the vegetable's vibrant pigments offer applications in natural food coloring and biodegradable materials. This review unified current knowledge on beetroot's nutritional and physical properties, and health-related functionalities.

Keywords: Beetroot; Nutrients; Health; Physical; Nitrates; Functional food.

1. Introduction

Beetroot (*Beta vulgaris* L.) belongs to the Chenopodiaceae family. It has bright crimson colour. Beetroot is commonly known as beet, chard, spinach beet, sea beet, garden beet, white beet and Chukander (in Hindi). It has very medicinal properties which give some positive effect on the human body. Beetroot can be eaten raw, boiled, steamed and roasted. Red beetroot is a rich source of minerals (magnesium, manganese, sodium, potassium, iron, copper) [1]. Beetroot is easy to grow and is always ranked as one of the top 10 vegetables grown in India. Beetroot is grown for food uses (pickles, salad, juice) rather than for sugar production. In contrast to other fruits, the main sugar in beetroot sucrose with only small amount of glucose and fructose [2]. With a pH of 7.5 to 8.0, beetroot (Beta vulgaris) is an alkaline food. Taproot (bulb) of beet plant. It is a biennial plant that grows in temperate climates. Beetroot & its juice are often eaten due to its delicious flavor, nutritional value, & flavor content. In India, it now produces 20-25 t/ha of fruit every year. People are getting more interested in usage of natural food colors these days, as synthetic dyes are being increasingly scrutinized by consumers. Fresh beetroot or beet powder, or extracted pigments, are used to enhance red color of tomato pastes, sauces, jams, jellies, ice creams, desserts, & morning cereals. It is acknowledged to include antioxidants due to presence of nitrogen pigments termed betalains, which are mostly composed of red-violet colored betacyanins [3].

It is mostly cultivated in India for its juice & vegetable value. Vitamins A, B1, B2, B6, & C are all present. It essentially refers to cool-season vegetable crops that are produced all over globe. Beetroot is rich in antioxidants & minerals and comes in a variety of hues ranging from yellow to red in bulb. Beetroots with a deep red hue are most widespread for human consumption, both cooked & raw in salads & juices. Carotenoids, saponins, betacyanines, betanin, polyphenols, & flavonoids are active chemicals found in beets. Betalains, which give beet roots is deep red color, are utilized as natural colorants in food industry & are gaining interest for its potential health benefits in humans, particularly in antioxidant & anti-inflammatory properties [4].

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(Source: htpps://www.healthline.com)

Figure 1 A fresh red beetroot

1.1. Nutritional and physical composition of Beetroot *(Beta Vulgaris)*

The nutritional value of fresh beetroot of various nutrients values per 100gm in energy, carbohydrate, protein, fats, calcium, phosphorus, iron, minerals, crude fibre and moisture are presented in table 1[5]. The various physical properties like mass, length, colour, diameter, shape, edible index and waste index of the average values are presented in table 2 [6].

Table 1 Nutritional value of beetroot per 100gms[5]

Fresh Beetroot	100gms
Energy	43
Carbohydrate	8.8
Protein	1.7
Fats	0.1
Calcium	18.3
Phosphorus	55
Iron	1.19
Minerals	0.8
Crude fibre	0.9
Moisture	87.7

Source: ICMR, NIN Nutritive value of Indian foods

Table 2 Physical properties of beetroot[6]

Physical Parameters	Average Value
Mass	178 gm
Length	7.06 cm
Colour	Deep reddish
Diameter	4.03 cm

Shape	Round
Edible index	88.24 %
Waste index	11.75 %

*Each value is average of three determinations

1.2. . Health-Promoting Properties of Beetroot *(Beta Vulgaris)*

1.2.1. Beetroot detoxifies liver

According to researchers, chemicals contained in beetroot cleanse liver & have potential to treat digestive system disorders in humans. It promotes liver cleaning, enhances liver function, & protects liver from harmful effects of excessive alcohol use. Beetroot juice has potential to treat liver & kidney disorders, especially fatty liver deposits caused by alcohol misuse, protein insufficiency, or diabetes. In addition, beetroot juice may dissolve kidney stones & relieve discomfort [7].

1.2.2. Beetroot combats high blood pressure

Blood pressure may be reduced in as little as 60 minutes after consuming two cups of beetroot juice, with a peak decrease happening 3-4 hours after consumption. Decrease in blood pressure was seen for up to 24 hours after juice was consumed. [8]. Nitrates in beets can significantly lower blood pressure after only a few hours of consumption. Both raw juice and cooked beets were found to be effective at lowering blood pressure and decreasing inflammation. However, raw beet juice had a greater effect. [9].

1.2.3. May help reduce risk of cancer

Beets get their rich color from betalains, which are water-soluble antioxidants, it also contains other flavonoids and polyphenolic compounds, which may have antioxidant and anti-inflammatory properties. Betalains and other antoxidants may help find and destroy free radicals or unstable molecules in the body, which, in large numbers, can promote inflammation and increase the risks of cancer [9].

1.2.4. Beetroots combats anaemia

Beetroot is particularly rich in iron. One cup of diced beets, which contains 1.1 milligrams of iron. Red beets contain a significant amount of iron. Eating beets and drinking beet juice can speed up the recovery of red platelets [10].

1.2.5. Good sources of minerals

Beetroot juice doesn't provides only potassium. It also provides other vital minerals like Selenium, Manganese, Phosphorous, Magnesium, Zinc, Sodium, Calcium, Copper, Iron [10].

1.2.6. The Deep Colour of Beets is Due to Betacaine

Beetroot hampered the growth of cancer. In recent study 2014 analysis found that betalaines contain chemo-preventive limits that combat hazardous cell lines that have been around for a while. [10].

1.2.7. Source of Vitamin C

Beetroot juice has been found to be an excellent source of vitamin C. Vitamin C supports the body's defence mechanisms against free radicals, additionally, it aids in wound healing, collagen formation, and iron absorption [10].

1.3. Who should avoid beetroot?

Beets are high in oxalates, which can lead to kidney stones. If one had kidney stones, avoid beets or eat only as a rare treat. Oxalates can also contribute to gout, a type of arthritis, so beets should be consume sparingly if one is at risks.[11].

1.4. A recipe for incorporating Beetroot *(Beta vulgaris)* juice to help manage Anaemia

- Ingredients: 1 large beet, trimmed and chopped, 1 apple, cored and chopped, and ½ lemon.
- Preparation: mix and grind all of the ingredients through a juicer. Serve juice over ice, if desired.
- Dosage: one of the great things about beet juice is that one can feel the effects in as little as three hours. [9]. According to a diet recommendation printed in the IOSR Journal of Nursing and Health Science, a study reported

that anaemic individuals can eat unsweetened beetroot juice for 20 days to increase their haemoglobin level. [10, 12, 13].

2. Conclusion

Beet juice is an appetizer drinks packed with nutrition, rich in antioxidant, vitamin and minerals potentially offering protection against degenerative diseases. Red beetroots are widely used in treatment of liver and fatty liver, prevention of anaemia, high blood pressure, cancer and cardiovascular diseases and it also have been associated with numerous health benefits.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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