

## 11. Superfoods: An Overview

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### **Abstract:**

*This book chapter gives an overview of [a] The role of healthy diet in prevention and treatment of various non communicable diseases [b] Conceptual understanding of several health foods on the basis of their core functions [c] Commonly available superfoods, their properties and health benefits. In the last section relevance of inclusion of superfoods in diet has been emphasized in Indian context.*

**Keywords:** Coconut, Health foods, Flax seeds, Garden cress seeds, Sesame seeds, Super foods.

### **11.1 Introduction:**

The nutrition transition has brought changes in dietary patterns as a result of increased consumption of processed foods that are high in calories, fats, free sugars, and sodium. Less consumption of protective foods and sedentary lifestyle have adversely affected the health of a large segment of the population.

Therapeutic use of diet has prevailed since time immemorial. A healthy diet plays a crucial role in prevention and treatment of various non communicable diseases (NCDs) and malnutrition in all of its manifestations. Nutrients present in the diet has a specific role in the body and ensure vitality and longevity. In past few decades the role of food was confined to the hunger satisfaction but advancement in the field of food and nutrition sciences have drawn the attention towards health foods (viz., nutraceuticals, superfoods and specific diets, functional foods etc.). Health foods are the products and ingredients which can use other than nutrition and as medicine. These are dietary substance used to supplement the diet by increasing the total daily intake, or a concentrate, metabolite, constituent, extract, or combinations of these ingredients. These foods are coupled with the regular diet. Superfood is a market term used for foods conferring health benefits resulting from an exceptional nutrient density.

## 11.2 Conceptual Understanding of Several Health Foods:

Food Safety and Standards Regulations (FSSAI,2016) has conceptualized several types of health foodson the basis of their core functions:

- A. **Food for special dietary use:** Foods that are specially processed or formulated for a certain physiological or specific health condition
- B. **Food for special medical purpose:** Foods intended for a particular dietary use and are specially processed or formulated used only under medical advice
- C. **Food with added prebiotic ingredients:** Foods that contain added prebiotic ingredients which are nonviable food components that confer health benefits to the consumer by modulation of gut microbiota.
- D. **Food with added probiotic ingredients:** Foods with live micro-organisms beneficial to human health, which when ingested in adequate numbers as a single strain or as a combination of cultures, provide one or more evident or verified health benefits on humans.
- E. **Health supplements:** A product that supplements the diet of a person over the age of five. The health supplement contains amino acids, enzymes, minerals, proteins, vitamins or other dietary substance that a nourishing or physiologically advantageous impact.
- F. **Novel food:** It refers to the ingredients that are derived from a food that may not have a history of human consumption, or a food or ingredient obtained by a new technology that provides some physiological or beneficial effect on human.
- G. **Nutraceuticals:** They provide a physiological benefit and help to maintain good health
- H. **Functional foods:** Foods that have a potentially positive effect on health beyond basic nutrition.

Functional food may be defined as any food that has a positive impact on an individual's health, physical performance, or state of mind, in addition to its nutritious value (**Doyon et al., 2008**). Superfoods falls within the functional food category, although there are several key differences. Functional foods are those that, when consumed at effective amounts as a regular part of a varied diet, "offer health advantages beyond the provision of necessary elements (e.g., vitamins and minerals)" (**Hasler et al., 2002**). Exceptionally nutrient-dense edible plants known as superfoods are used both as food and medicine. They belong to a category of concentrated, nutrient-rich meals that can improve general health, strengthen the immune system, increase serotonin synthesis, and cleanse and detoxify the body. These are capable of meeting all of the body's nutritional needs, including those for proteins, vitamins, minerals, glyconutrients, and vital fatty acids (**Anindita et al., 2022**).

Superfoods have emerged as a new alternative to combine the extraordinary benefits of functional characteristics with their individual exotic and natural properties as a result of rising consumer awareness of healthy lifestyles and well-being (**Tacer et al., 2019**). They not only help in the nourishment of brain, bones, muscles, skin, hair, nails, heart, lungs, liver, kidneys, reproductive system, pancreas, and immune system, they also, balance and helps to guide towards a more natural and indigenous diet. It can significantly impact on maintenance of ideal weight, diet, food habits and helps to detox and switch to healthier foods without having dead vitamin and mineral supplements (**Wolfe et al., 2009**).Some of the commonly used superfoods are flaxseeds, aloe-vera, garden cress seeds, sesame seeds,

Indian black berry, Indian gooseberry, coconut, turmeric, jackfruit, raw banana, shatavari, moringa, ashwagandha, turmeric, etc., In this chapter, we have discussed some of the sustainable superfoods which are not only nutrient dense and can be also easily included in daily diet.

**Table 11.1: Commonly Available Superfoods in India their Property and Health Benefits.**

Sr. No.	Scientific Name	Indian Name	Common Name	Health Benefits
1	<i>Linum usitatissimum</i>	Alsi Seeds	Flax Seeds	<ul style="list-style-type: none"> <li>• Anti-ulcer activity anti-secretory effect</li> <li>• Controls dyslipidaemia</li> <li>• Prevents cardiovascular disease</li> <li>• Hunger suppression</li> <li>• Prevents neurodegenerative disease</li> <li>• Controls hyperglycaemia</li> <li>• Control hypertension</li> <li>• Protection against cancer</li> </ul>
2.	<i>Lepidium sativum</i>	Aliv Seeds	Garden Cress Seeds	<ul style="list-style-type: none"> <li>• Fracture healing property</li> <li>• Anti-anaemic effect</li> <li>• Antimicrobial activity</li> <li>• Antidiabetic effect</li> <li>• Anti-hypercholesterolemic effect</li> <li>• Anti-oxidant effect</li> <li>• Anti-hypertensive</li> <li>• Antidiuretic effect</li> </ul>
3.	<i>Phyllanthus emblica</i>	Amla	Indian Gooseberry	<ul style="list-style-type: none"> <li>• Anti-hypercholesterolemic effect</li> <li>• Anti-oxidant effect</li> <li>• Anti-hypertensive</li> <li>• Anti-anaemic effect</li> <li>• Antidiabetic effect</li> <li>• Hepatoprotective activity</li> <li>• Anti-aging effect</li> <li>• Boosts Immune system</li> </ul>
4.	<i>Sesamum indicum</i>	Til	Sesame Seeds	<ul style="list-style-type: none"> <li>• Anti-hypercholesterolemic effect</li> <li>• Anti-oxidant effect</li> <li>• Anti-hypertensive</li> </ul>

Sr. No.	Scientific Name	Indian Name	Common Name	Health Benefits
				<ul style="list-style-type: none"> <li>• Antidiabetic effect</li> <li>• Anti-cancer effect</li> <li>• Hepatoprotective activity</li> </ul>
5.	<i>Cocos Nucifera</i>	Nariyal	Coconut	<ul style="list-style-type: none"> <li>• Anti-hypercholesterolemic effect</li> <li>• Anti-microbial activity</li> <li>• Anti-cancer effect</li> <li>• Hepatoprotective activity</li> </ul>

### 11.3 Flax Seeds:

*Linum usitatissimum* is an oilseed *rabi* crop. India is one of the major producers of flax seeds worldwide and the chiefly producing states are Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Maharashtra, and Bihar (Singh et al., 2011). It belongs to family Linaceae and is commonly known as 'Alsi', 'Teesi', 'Jawas' or 'Lin Seeds'. It is an excellent source of essential fatty acids (both alpha-linolenic acid and linolenic acid), dietary fibers, lignans, polyphenols with strong anti-inflammatory and antioxidant properties (Boone et al., 2013). The proximate profile of flaxseeds depicts moisture content 6.5 %, fat 36.7 %, carbohydrate 26.1 %, protein 19.67 %, ash 2.41 % and crude fiber 5.49 %, respectively. Mineral composition in 100 g of flaxseeds display calcium 231.5 mg, phosphorus 638.3 mg, magnesium 288 mg, Iron 2.83 mg, copper 14.1 mg and Zinc 21.67 mg (Mancharkar et al., 2020). Total phenolics content is 295.92±2.3 (mg GAE 100 g<sup>-1</sup>), Total flavonoids content is 25.85±0.4 (mg QE 100 g<sup>-1</sup>), and Antioxidant activity is 1.45±0.02 (mmol Trolox 100 g<sup>-1</sup>). Fatty acid methyl esters (FAME) are present in a decent amount and it consist alpha-linolenic acid as the major fatty acid (54.51% of total FAME) followed by oleic acid (17.38%), linoleic acid (16.13%) and palmitic acid (5.95%) (Panaite et al., 2017).

- **Health Benefits:**

**Role in Cancer:** Flaxseed can inhibit the growth of tumours and also reduces the development of blood vessel cells, it can offer protection against malignancies of the breast, colon, prostate, thyroid, and ovaries. Flaxseed's ability to inhibit tumour growth can be credited to its high Secoisolariciresinol di Glucoside (SDG) Lignan concentration (Mason and Thompson, 2014). According to a study lignans present in flaxseeds have anti carcinogenic potential against hormone induced cancer, (viz., prostate cancer) (Waldschlager et al., 2005). A study in rats revealed that flaxseed lignans significantly reduces the size of mammary tumours by more than 50% and the number of tumours by 37% (Katare et al., 2012).

**Role in Cardiovascular Diseases:** Flaxseed is said to lower the risk of is a rich source of alpha-linolenic acid, which has the ability to lower triglycerides, blood pressure, and Cardiovascular Diseases. (Mozaffarian et al., 2005). It also has abundant amount of dietary

lignans, a class of phytoestrogens which have lipid lowering and antioxidant properties (**Vanharanta et al., 2002**). They consist decent amount of lignans which have an impact on a variety of bodily metabolisms, including cardiovascular responses, as they are selective estrogen receptor modulators (SERMs). Flaxseed may therefore aid in reducing blood plasma low density lipo-protein (**Zhang et al., 2008**). A study conducted on LDL receptor deficient mice to assess the antiatherogenic effects of flaxseeds have been reported in the LDL receptor deficient mice (**Dupasquier et al., 2007**)

**Role in Diabetes:** The  $\omega$ -3 fatty acids, lignans, and dietary fiber in flaxseed constitutes its protective effects against diabetes (**Goyal et al., 2014**). Soluble fiber and lignan from flaxseed may reduce blood sugar's glycaemic response, prolong feelings of fullness, and aid in the fight against obesity. There are evidences which support the significant role of flaxseeds in diabetic patients by maintaining blood sugar level. The reduction in postprandial blood glucose by 7.9% and 19.1% was observed in diabetic females after giving 15g/day and 20g/day, respectively flaxseed powder as supplement. (**Pan et al., 2009 and Kapoor et al., 2011**).

**Role in diseases:** Flax seeds are rich in  $\omega$ -3 fatty acids, which have anti-inflammatory qualities that prevent adult kidney damage, consuming them offers a number of positive health effects. Consuming flaxseed and products containing flaxseed raises ALA content, which may lessen the symptoms of chronic renal disorders. (**Gopinath et al., 2011**).

**Other Health Benefits: The studies reported** flaxseed fiber may be effective in various cases such as hypocholesterolaemia, constipation, gastrointestinal motility, glucose intolerance, and fermentation (**Kristensen et al., 2013 and Mani et al., 2011**). The soluble fiber in flaxseed has been associated to the laxative effects of flaxseed fibers in both young and old humans. (**Vaisey-Genser et al., 2003 and Morris et al., 2007**). Flaxseeds have non-starchy soluble dietary fiber which produces viscous liquids. It slows down the emptying of the stomach, which reduces the absorption of nutrients in the small intestine. Thus, it can aid in the prevention of illnesses linked to obesity. (**Singh et al., 2011**).

**Uses:** Flaxseeds can be incorporated in diet either raw or in processed form. A tablespoon or two of ground flaxseed meal or roasted flaxseeds can be simply added to salads, soups, and smoothies which enhances the nutritional profile of the diet excellently. Flaxseeds can also be added to laddoos, panjiri, energy bars, biscuits and other snacks which not only enhances the palatability it also improves the nutritional profile of the food.

#### **11.4 Garden Cress Seeds:**

*Lepidium sativum* is a nutrient rich annual herbaceous plant with various pharmacological and antioxidant properties. It belongs to the family of Brassicaceae and is commonly known as 'Halim Seeds' or 'Chandrasura Seeds' and 'Aliv Seeds'. Garden cress seeds can be included in daily diet as it is a packed source of minerals, vitamins, crude fibre, proteins, flavonoids, unsaturated fatty acids (linoleic and arachidic acids) and phenolic acids. The proximate profile of garden cress seeds depicts moisture content 5.12 %, crude lipids 27.85 %, carbohydrate 35.81 %, crude protein 24.29 %, ash 4.26 % and crude fiber 7.79 % respectively.

Mineral composition in 100 g of garden cress seeds displays calcium 243.12 mg, phosphorus 427.36 mg, magnesium 239.4 mg, potassium 975.16 mg, iron 8.34 mg, sodium 19.65 mg, copper 1.25 mg and zinc 1.19mg (Gaafar et al., 2013).

- **Health Benefits:**

**As a Galactagogue:** Consumption of Garden Cress Seeds by lactating mothers increases milk production and secretion. It has high iron and protein content, which is often given post-partum as effective galactagogue to induce lactation in nursing mothers to meet the nutritional requirement of their children. Through interactions with dopamine receptors, they exert their pharmacological effects, raising prolactin levels and enhancing milk production (Pattnaik et al., 2003).

**As an Emmenagogue:** Garden cress has mild oestrogenic properties which helps to regulate the menstrual cycle. It is an emmenagogue herb and have the ability to provoke menstruation. It induces blood flow in the pelvic area and uterus and thus stimulate menstruation. Garden cress seeds are used as emmenagogue in order to stimulate menstrual flow due to hormonal disorders or conditions like oligomenorrhea (Pattnaik et al., 2003).

**As gastro intestinal tract cleansing agent:** Garden cress helps in stimulating appetite and cleanses gastro intestinal tract because the test of these seeds contains mucilage which can be used as a laxative and a purgative during constipation. The mucilage of the germinating seeds reduces the irritation of the intestines in dysentery and diarrhoea. It is also used in treating bleeding piles.

**As haematic agent:** Garden cress seeds is the rich source of non-heme iron which is an easily absorbed dietary iron. It helps to enhance the haemoglobin level in blood. Its regular supplementation helps to reduce anaemia and the intake of vitamin C half an hour after consumption of these seeds enhances iron absorption. L-ascorbic acid forms a chelate with ferric iron which facilitates iron absorption at acidic pH that changes them into a ferrous state. It is soluble in the duodenum's alkaline pH and is easily absorbed. (Lynch et al., 1980 and Monsen et al., 1988)

**Fracture healing Activity:** In a study conducted on rats it was observed that the callus forms in the test rabbits given garden cress seeds with the fractures were significantly higher than those in the comparison group. This suggests that garden cress seeds significantly aided and accelerated callus development in fractures. The findings support their impacts on human beings for fracture healing. (Juma et al., 2007)

**Other health benefits:** Garden cress seeds are rich in arachidic and linoleic acids which acts as a memory booster (Sharma et al., 2011). They are a good source of iron and protein and hence helps to increase the lean body mass (CSIR, 1962). It helps in synthesis of different non-essential amino acids, as it is a good source of folic acid. Its regular supplementation can greatly help in boosting immunity and libido naturally. It is good for the eyes as it is a good source of carotene, which is the precursor of vitamin A (Pattnaik et al., 2003).

**Uses:** Garden cress seeds can be consumed either raw or in a processed form. It is advisable to add it raw salads, soups, and smoothies or can also be incorporated to laddoos, panjiri, energy bars, biscuits and other snacks which not only enhances the palatability it also improves the nutritional profile of the food. When Garden Cress Seed is crushed and drunk with hot water it is beneficial to treat colic disease. Garden Cress Seeds paste can be taken with honey to treat amoebic dysentery (**Pattnaik et al., 2003**).

### **11.5 Indian Gooseberry:**

*Phyllanthus emblica* also known as ‘Indian Gooseberry’ or ‘Amla’ is a bright yellow-green berry with various therapeutic properties. It belongs to the family Phyllanthocin. Amla is regarded as one of the richest sources of vitamin C and is high in polyphenols, minerals, and other nutrients. It boasts about 17 times the antioxidant strength of a pomegranate, twice the antioxidant power of an acai berry, and eight times the vitamin C of an orange (**Akram et al., 2022**). The nutritional profile of amla consists carbohydrate 14.1 %, protein 0.5 %, fat 0.1 %, fiber 3.4 %, calcium 0.05%, phosphorus 0.02%, iron 1.2 mg/100gm, nicotinic acid 0.2 mg/100gm, ascorbic acid 600 mg/100gm, thiamine 30 mg/100gm (**Anindita et al., 2018**).

**Health Benefits:** Many health benefits of Indian Gooseberry have been reported by researcher (**Akram et al., 2022**)

**Heartburns:** Study suggest that supplementation of 1000 mg of Amla fruit tablets can reduce the frequency and severity of heartburn and vomiting in people with gastroesophageal reflux disease (GERD) (**Akram et al., 2022**).

**Anti-aging:** Indian gooseberry has some promising anti-aging properties because of its high vitamin C content. Antioxidants like vitamin C can help stop cellular damage, which could slow down the natural ageing process in the body. Indian gooseberry may help prevent the breakdown of collagen, which forms the firm but flexible protein matrix in the skin and soft tissues. It can also promote hair growth, and may inhibit an enzyme that contributes to hair loss. Indian gooseberry extract improves the mitochondrial health of eye cells caused due to age-related macular degeneration (AMD) (**Akram et al., 2022**).

**Immune health:** Due to its high vitamin C concentration, Indian gooseberry may have some immune-strengthening properties. Approximately 600–800% of the Daily Value (DV) for this vitamin is present in a single Indian gooseberry. Numerous approaches exist for vitamin C to improve immunological function. Due to its antioxidant properties, it helps to reduce cellular harm and inflammation. By encouraging the growth of phagocytes, which are specialized immune cells that aid in scavenging dangerous invaders, vitamin C may aid in boosting the immune system. Additionally, it might aid in the body's development of antibodies that defend against incoming dangers (**Akram et al., 2022**).

**Cardio Vascular Health:** Indian gooseberry is most frequently used to support heart health. Indian gooseberry may lower your risk of heart disease in a variety of ways. *Amla* extracts can protect against the oxidative damage that can cause heart injury. It can improve blood

fat profiles, including lower triglyceride and total low-density lipoprotein (bad cholesterol) as well as increased high-density lipoprotein (good cholesterol) (Akram et al., 2022).

**Reduces blood pressure:** *Amla* can help in reducing high blood pressure levels by acting as a vasodilator (Akram et al., 2022).

**Anti-platelet effects:** Indian gooseberry supplementation may help in preventing the formation of blood clots, which may cause a heart attack or stroke if they block an artery.

**Blood sugar level:** Indian gooseberry has been shown to help in lowering blood sugar levels and helps in the treatment of hyperglycaemia (Akram et al., 2022).

**Liver protection:** Indian gooseberry extract can protect against liver damage caused due to a high fat diet or N-nitrosodiethylamine, it is probably because of its antioxidant and anti-inflammatory properties (Akram et al., 2022).

**Uses:** Chutneys, pickles, candies and vegetable dishes are all made with the fruit as a source of culinary use. *Amla* is also used to prepare the sweet treat known as *Murabba*. Ripe fruit can be used to make fresh juice, and its concentrate is also available commercially for making easily consumable diluted juice (Baliga et al., 2011).

## 11.6 Sesame Seeds:

*Sesamum indicum* also known as ‘sesame seed or ‘til’ is a tropical oil seed plant belonging to the family Pedaliaceae (Aglave et al., 2017). It is an excellent source of nutrients, including heart-healthy mono- and polyunsaturated fatty acids, fiber, protein and minerals viz., copper, magnesium, calcium, iron and zinc (Boone et al., 2013). According to FAOSTAT 2021 it is one of the most cultivated and oldest oilseeds worldwide. Its annual production was higher than 6.5 million tons, led by Sudan, Myanmar and India in 2019. Sesame seed oil has several beneficial physiological effects which consists about 2% unsaponifiable matter, including phytosterols, triterpenic alcohols, tocopherols and lignans, which provides high oxidative stability (Capellini et al., 2019). The proximate profile of Sesame seeds depicts moisture content 3.49 %, fat 56.56 %, carbohydrate 18.44 %, protein 15.67 %, ash 5.48 % and crude fiber 8.22 % respectively. Mineral composition in 100 g of sesame seeds displays magnesium 182.47 mg, iron 7.37 mg, sodium 105.52 mg and zinc 4.47 mg (Dravie et al., 2020), calcium 281.1 mg, phosphorous 157.0 mg, potassium 106.7 mg and manganese 1.03 mg (Bambigboye et al., 2010). Its fatty acids profile consists 16.67 % saturated fatty acids, 41.34 % monounsaturated fatty acids (MUFA) and 41.99% polyunsaturated fatty acids (PUFA). It has high amount of Vitamin E about 432.03 mg/100g. Sesame seeds has high antioxidant activity in which FRAP is 6.8 mmol FSE/100g and DPPH 86.4 mg TE/100g (Melo et al., 2021).

- **Health Benefits:**

**Cardio Vascular Health:** Lignans such as sesmolin, sesaminol, sesamolol, and sesamin present in sesame seeds possess heart health-enhancing activities (Alobo et al., 2006). It possesses physiologically active ingredients which can lower blood cholesterol and lipid

levels, provides anti-inflammatory properties and also induces hepatic fatty acid oxidase and neuroprotective effects on brain damage or hypoxia (Soleymani et al., 2020). Sesame seed oil supplementation can reduce the cerebrovascular ischemia (Sharma et al., 2020). It can also work efficiently with the medication against diabetics, which results in curing hyperglycaemia (Farbood et al., 2019).

**Antioxidant Activity:** The sesame seed oil has free radical scavenging, antioxidative, and anti-inflammatory properties which can potentially acts against diazinon-induced stress (Farouk et al., 2021). It can also reduce blood pressure and work significantly in the variation of the electrolytes, increasing antioxidants, and decreasing the lipid peroxidation (Aslam et al., 2019). The antioxidant properties present in sesame seeds induces the free radical scavenging activities such as DPPH, TPC, and FRAP. Due to its high antioxidative property, it can be used in nutritional and medicinal sectors (Ghosh et al., 2021). Sesame seed supplementation has been demonstrated to raise plasma tocopherol levels and stimulate vitamin E action, which aids in the prevention of cancer and heart disease. (Ma et al., 2019)

**Enzymatic Activity:** Three different enzymes (viz., papain, pepsin, and alcalase) present in sesame seeds tend to produce more hydrolysates and enhances the rate of hydrolysis. These hydrolysates exhibit low-molecular-weight bioactivepeptides which have exceptional functional attributes together with antihypertensive effects, antioxidant properties, and enhances digestibility mechanism (Mohammed et al., 2019).

**Anti-Cancerous Activity:** Sesame seeds contains myristic acid which has various anti-cancerous activity (Wu et al., 2019). It has been traditionally used as antidiabetic, antitumor, anti-ulcer, cardioprotective, chemoprotective, and laxatives (Buckvicki et al., 2020). Sesame oil can selectively inhibit the growth of malignant melanoma due to its large amounts of esters of linoleic content (Soleymani et al., 2020).

**Hepatoprotective Activity:** Sesame seeds also contains lecithin, which has hepatoprotective activity and is effective in decreasing liver steatosis in patients (Rohilla et al., 2018).

**Uses:** Sesame is mainly cultivated for its oil, which is used in food preparation like tahini, sauce, and toppings for salads, among other things. (Sarkis et al., 2015), but also for cosmetics and dietary supplements (Gharby et al., 2017). By-products obtained of sesame seeds after extracting oil by hydrolysis contains protein lumps and various bioactive peptides, which have a significant role in pharmaceuticals (Yannakoulia et al., 2018). Sesame oil is utilized as a solvent in intramuscular injections in pharmacological industry. It functions as a laxative in addition to having nutritive, soothing, and ointment qualities. Sesame seeds oil are also used for the treatment of toothache and gum diseases (Yadav et al., 2020).

### **11.7 Coconut:**

Coconut also known as 'Nariyal' or 'Copra' is a fruit tree that is grown all over the world. The botanical name of coconut is *Cocos nucifera* and it belongs to the family Aracaceae. The dietary part of coconut is endosperm The cellular endosperm initially resembles a

translucent, jelly-like structure; but, as it develops, it hardens and matures into white flesh (coconut meat). When the cavity of the embryo sac is not completely filled throughout the cellularization process; instead, the cavity is substantially filled with water, which is known as coconut water (**Ramesha et al., 2018**). The endosperm of coconut is packed with abundant amount of nutrients and according to **USDA 2002** 100 gm of coconut endosperm contains moisture content 46.99%, total sugar 6.23 %, carbohydrate 15.33 %, protein 3.33%, total dietary fiber 9.00 % and fat 33.49 % which have 29.698 g saturated fatty acids, 1.425 g monounsaturated fatty acids (MUFA) and 0.366 g polyunsaturated fatty acids (PUFA).

The main fatty acids present in coconut oil are the lauric (12:0), myristic (14:0) and palmitic (16:0) acids, which represent 46%, 17% and 9% of the Fatty Acid, respectively (**Vasudevan et al., 2013**). It contains the minerals such as magnesium 32 mg, iron 2.43 mg, sodium 20 mg and zinc 1.10 mg, calcium 14 mg, phosphorous 113 mg, potassium 356 mg and manganese 32 mg. It also contains both soluble and insoluble vitamins that are vitamin C 3.3mg, thiamine 0.066 mg, riboflavin 0.020 mg, niacin 0.540 mg, vitamin B<sub>6</sub> 0.054, folate 26 µg, vitamin K 0.2 µg, vitamin E 0.24 mg (**USDA 2002**).

#### **Health Benefits:**

- **Role in Cancer:** The coconut oil inhibits the growth of cancer and induces their death cells (**Kamalaldin et al., 2015**). Supplementation of coconut was given to the patients with breast cancer which improved the general condition of the patients and has also helped to reduce the undesirable effects of chemotherapy (**Law et al., 2014**). The brain receives ketones from the digestion of medium chain fatty acids (MCFAs) in coconut oil which can aid in the battle against cancer since tumour cells cannot access the energy from ketones and are dependent on glucose. (**Ramesha et al., 2018**)
- **Antimicrobial Activity:** Coconut oil is traditionally used as an antibacterial agent. It has antibacterial properties against several types, including candida (**Ogbolu et al., 2007**) and staphylococcus (**Tangwatcharin et al., 2012**). Additionally, it lessens oral disease caused by a bacterial infection known as gingivitis that is associated to plaque (**Peedikayil et al. 2015**). The oil is highly powerful against the main cause of tooth decay, streptococcus variants. Furthermore, studies have shown that coconut oil is effective against *Candida albicans*, the yeast that is known for causing thrush, another issue with oral health (**Ramesha et al., 2018**).
- **Cardio Vascular Health:** It helps in reducing the overall level of body fat and it also boosts the metabolism. **Tsuji et al. (2001)** conducted a study with the participation of healthy persons has proved that eating a diet high in medium chain triglycerides (MCTs) contributes to weight loss and helps reduce body fat. Natural saturated fats, such as those found in coconut oil, lessen the risk of heart disease by converting low density lipoprotein (LDL) into high density lipo-protein (HDL) and raising levels of HDL in the body. Coconut oil's lauric acid decreases candida, fights germs, and fosters an unfriendly environment for viruses. The oil is effective as an additional therapy for kids with community-acquired pneumonia when taken orally (**Ramesha et al., 2018**).
- **Hepatoprotective Activity:** The medium chain triglycerides and fatty acids present in coconut oil helps to prevent liver diseases as they easily are converted into energy when they reach the liver. Hence, it reduces work load on the liver and also preventing accumulation of fat (**Obidoa et al., 2010**)

**Uses:** It is used all around the world for decorations as well as for its culinary, non-culinary and many other uses. It is broadly called as ‘Kalpaviriksha’ or ‘Tree of Heaven’ (**Ramesha et al., 2018**) due to its numerous uses from all the part of the tree (**Assa et al., 2010**). For example, Roots are used for healing, while leaves and trunks are used for construction. The most important part of the plant is the fruit, which can be divided into two layers: the inner layer, which is used to make cosmetic products and a variety of foods like coconut water, coconut milk, coconut shavings, coconut flour, and coconut oil, and the outer layer (husk), which is used to make carpets, ropes, and fibers (**Prades et al., 2012**).

### **11.8 Summary:**

Superfoods have been used as a marketing tool for promoting specific foods conferring health benefits resulting from an exceptional nutrient density. It is impractical for people to have a diet based only on superfoods when nutrients are provided from a diet based on a diversity of foods especially a diet which includes fruits and vegetables. However, their inclusion and upscaling in diet has become relevant on consideration of hidden hunger and unprecedented rise in the non-communicable diseases in India.

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