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Functional properties of spread from multi seeds

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Abstract

Functional spread is a category of spread rather paste formed by utilising nutritive and healthy seeds such as sesame seeds, sunflower seed, pumpkin seeds and nuts like almonds to attain a nutrient dense amalgam. Its semi-fluid viscosity enables it to spread effortlessly over the surface of food, including toast, and it also functions as a nutritious dip. Being oilseeds by nature, sesame and sunflower seeds offer the ideal texture and consistency needed for a spread in addition to having health advantages. This particular spread has high antioxidant and vitamin-E content. One of the 13 vitamins that are necessary to animals but are not generated by them is vitamin E. Till date, six natural organic compounds belonging to the chemical family of tocopherols—four tocopherols and two tocotrienols—have been demonstrated as exhibiting vitamin E activity in animals. The principal sources of vitamin E in the human diet are items made from edible plants, particularly seed oils. Even though vitamin E is widely available, independent nutritional studies have found that mild to severe vitamin E deficiencies affect human communities. Functional spread is believed to be a better option than fatty butter and spreads now on the market since it imparts minerals like magnesium, linoleic acid, or Omega 6, and dietary fibres when compared to spreads already available in the market. In this particular spread, sugar is replaced with healthier option such as natural sweetener like dates and honey which contributes towards a nutritive version.

Keywords: Functional spread, vitamin E, antioxidants and lenoliec acid etc.

Introduction

Globally, the butter also regarded as spread which is obtained from animal source is widely consumed. It has captured a dominant place in Indian market as well [25]. The Butter or spread is consumed generally due to its creamy aroma and pleasant mouthful texture in variety of food items such as cakes, chocolates, ice cream, cookies and many more [73]. Butter is considerably high in fat which is about 80% dairy fat, when it is consumed more frequently the animal based butter leads to crippled illness such as overweight, cardiovascular diseases, and Type 2 diabetes. Trevisan 1990, also conjectured that butter has a major impact on metabolism of glucose and blood pressure that leads to hypertension, coronary heart diseases when it is being consumed often. Products obtained from dairy constitutes a greater impact on the environment because the dairy animals occupy the large area for turning, stanchion barns and a paramount factor for greenhouse gas emission and discharge. Out of the dairy products, butter has the outrageous environmental impact with 20.69 - 21.30 kg carbon dioxide release per kg of product in life cycle estimation [32]. Because of these factors like consumption of fat in high amounts and impacts regarding environment, plant based replacement and substitutes are attaining interest in the present era, also other social undertaking like veganism, violence against animals promotes dairy alternatives. As a substitute various oilseeds can also use as the source of butter alternatives with particular treatments and added flavour to emulate the buttery fragrance, feel and texture. The importance of functional foods, nutraceuticals, food supplements and other natural diet compounds has been linked with promotion of health and prevention of disease [74, 56]. The consumption of omega-3 FAs is recommended for improving immunity, functioning of brain and health of humans [99, 22, 66]. Sesame seeds are usually dehulled and then roasted before use; by this their functional properties gets improves, the release of flavour and colour is better, and their sensorial quality also gets improved. By dehulling the seeds, relatively high amounts of anti-nutritional oxalic acid and fiber contained in the testa (seed coat) are removed, which results in lighter-coloured, less bitter-tasting seeds [15-17]. Sesame seed also seems to exerts many health benefits, such as hypercholesterolemia effects, anticancer activity, oxidative stress attenuation, and blood pressure reduction [81].

The Sunflower Seed is also incorporated in spread preparation as it has no particular flavour or taste but when roasted seeds give off nutty and creamy flavour [30]. Other ingredients used for the spread manufacturing are almonds, date and honey which serves as a natural sweetener.

History of Sesame

Sesame (*Sesamum indicum*, family *Pedaliaceae*) is regarded as one of the inaugural domesticated crops and oilseed plants known to humanity with its diversified uses. It is native to the tropics and subtropics but is most familiar in the narrower belt closer to the equator, mostly north of it [10]. The original home of this crop is known to be Ethiopia [19]. The major sesame producers are India, Myanmar, China and Sudan with 68% of the total world production [13]. For a time immemorial, it is being used in religious rituals in India, Egypt, and Persian region [50, 92]. Sesame is considered as “queen of oilseeds” owing to its oil quality [16, 15].

Table 1: Composition of dry decorticated sesame seed per 100 g

| Components | Quantity |
|------------------|-------------------|
| Water | 3.75 g |
| Energy | 2640 kJ; 631 kcal |
| Protein | 20.45 g |
| Fat | 61.21 g |
| Carbohydrate | 11.73 g |
| Dietary fiber | 11.6 g |
| Calcium | 60 mg |
| Magnesium | 345 mg |
| Phosphorus | 667 mg |
| Potassium | 370 mg |
| Iron | 6.36 mg |
| Zinc | 6.73 mg |
| Vitamin A | 66 IU |
| Thiamine | 0.70 mg |
| Riboflavin | 0.09 mg |
| Niacin | 5.80 mg |
| Folate | 115 µg |
| Alpha-tocopherol | 1.68 mg |
| Ascorbic acid | 0.00 |

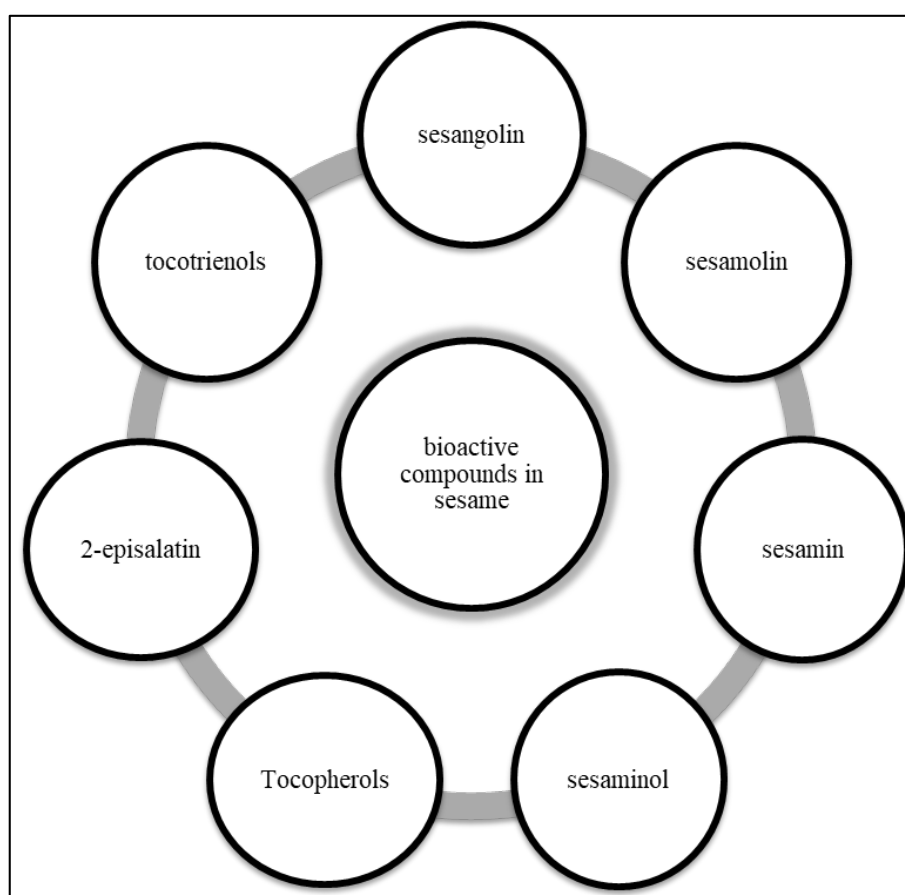


Diagram 1: Bioactive compounds present in sesame

Diagram: The presence of oxalic acid in sesame seeds makes it little bitter in taste. The antioxidant property of sesame seed along with numerous health properties is accredited to the presence of lignans like sesamum, sesamol, sesamol, sesangolin, 2-episalatin, and isomers of tocopherol [51]. Tocopherols and tocotrienols act as strong antioxidants and imparts stability to the oil. In traditional Chinese and Indian systems of medicine like Ayurveda, sesame occupies a vital position with various pharmaceutical applications. In China, sesame oil is used in treatment of toothaches and gum diseases. In India, it is being used as an antibacterial mouthwash to soothe anxiety and insomnia and in the

treatment and curing of blurred vision, dizziness, and headache. Sesame is a high-energy imparting food containing approximately 50% oil. The fatty acid composition of sesame oil is highly desirable with about 80-85% unsaturated acids and scarcely 15-20% of saturated acids. Sesame oil comprises mainly of linoleic (35-50%) and oleic (35-50%) acids, with little amount of palmitic (7-12%) and stearic (3.5-6%) acids, however with only traces of linolenic acid [52, 83]. Consumption of sesame seed leads to increase in plasma gamma-tocopherol and it enhances vitamin-E activity that can prevent cancer and diseases related to heart. Sesame seed contains cephalic, a compound having haemostat activity.

Fibres from sesame are often used as an antidiabetic, antitumor, antiulcer, in prevention of ulcers and cardio protective [69]. Sesame seeds are high in sulphur containing amino acid like methionine, tryptophan and cysteine and accommodate 50% of stable oil with high oleic acid content [49].

Utilization of Sesame in Functional Spread

The butter or spread made from sesame is called as tahina/ tahini which comprises of citric acid, sugar and root extracts of *Saponaria officinalis*, and it is utilized in confectionary and bakery foods of middle eastern countries. A.P Gandhi in year 2009 had produced sesame seed butter in simple process that involve in soaking of white sesame seeds in water for about 24hrs and removal of kernels. The bran is usually removed by dipping the seeds in salt water, then dried and roasted. Finally the seeds were grinded with addition of sesame oil and salt. The physical and nutritional properties of sesame butter were studied upon. A novel product was developed using low fat sesame paste and date syrup as fat substitute [43].

Table 2: The composition and nutritional value of sesame butter Characteristics Values

| Moisture | Wb 1% |
|-----------------------|---------|
| Crude protein | 26% |
| Crude fat | 51% |
| Carbohydrates | 18% |
| Minerals per 100 gram | |
| Calcium | 141 mg |
| Phosphorus | 790 mg |
| Sodium | 1 mg |
| Zinc | 10.4 mg |
| Copper | 1.5 mg |
| Iron | 6.4 mg |
| Magnesium | 353 mg |
| Potassium | 459 mg |

Therapeutic potential of sunflower seeds in functional spread

Sunflower seeds are rich in proteins that have favourable amino acid distribution. The tocopherols, minerals, and vitamins are also provided by sunflower seeds in considerable amounts [82]. Sunflowers seeds are also rich in minerals like calcium, copper, iron, magnesium, manganese, selenium, phosphorous, zinc, potassium and sodium [8]. Sunflower oil is rich in oleic acid (C18:1) and linoleic acid (C18:1). These fatty acids are capable of reducing the LDL cholesterol and total cholesterol and thus decreases the chances of coronary artery disease [27]. Phytosterols have been found in high amounts [270-289mg/100gm] in sunflower seeds which are efficient in reducing cholesterol, increasing immunity and reducing the risk of colon cancer [75].

Nutritional composition of Pumpkin seeds

The *Cucurbita maxima* seed plays a significant role in the human diet as a source of lipids, proteins, carbohydrates, and other nutrients required for sustaining good health [4]. The seeds of the *cucurbita maxima* plant may be a significant and cost-effective source of proteins, minerals, calories, and

vitamins that are crucial for human nutrition. The class of naturally occurring substances known as lipids, or "fats" in Greek, includes both fats and oils. Lipids, a component of both animal and plant cells, are insoluble in water but soluble in organic solvents including ether, chloroform, benzene, and hexane. The most significant lipids in nature are fatty acids and oils, which when hydrolysed produce glycerol and long-chain fatty acids. It is one of the three main "Food categories" that the body needs, along with proteins and carbohydrates. Despite being commonly present in diet, fats and oils have excellent nutritional value. They give animals a concentrated store of energy for preserving their ideal body temperatures. 9 Kcal are produced for every gram me of digested fat or oil. However, the comparable values for protein and carbohydrates are 4 and 5.5 Kcal, respectively [12]. According to current estimates, the human race consumes almost 40 million tonnes of fats and oils annually, demonstrating both their importance for nutrition and industry. This consumption is also steadily rising.

Table 3: The seed of *C. maxima* has the following approximate compositions

| Nutrient | Amount |
|-------------------|-------------|
| Protein | 33.48% |
| Carbohydrate | 28.68% |
| Fat | 30.66% |
| Iron | 3.07% |
| Ash | 3.98% |
| Accessible energy | 524.58 Kcal |

Source: [53]

The potential of pumpkin seed as a functional food

In many cultures around the world, pumpkin seeds are eaten raw as a snack food and are particularly well-liked in Arabian nations after being salted and roasted [5]. Some foods have been prepared with pumpkin seed kernels as seasonings [70]. It is known that seeds from the Cucurbitaceous family contain as much oil as soybean, cottonseed, or maize [35]. Pumpkin seeds are a fantastic source of protein (25.2-37%) and oil (37.8-45.4%) [58]. Pumpkin seeds (*Cucurbita* spp.) are prized for their substantial levels of linoleic acid, an important fatty acid and high protein content [60]. Amazingly high percentages of critical amino acids are present in pumpkin seeds. Pumpkin seeds also contain significant amounts of many necessary microelements, including K, Cr, and Na Mg, Zn, Cu, Mo, Se, and other minerals are abundant in pumpkin seeds. Several phytochemicals, including polysaccharides, phenolic glycosides, NEFA, and proteins, have been extracted from germinated seeds [41]. According to [42] almond kernels contain nutrients and phytochemicals that may be beneficial for preventing obesity, diabetes, and heart disease. The restriction on the bio accessibility (release) of nutrients like lipids from almond tissue during mastication and digesting is a key mechanism behind these advantages. Recent research has shown how crucial dietary shape is to the digestion of plant meals. The almond kernel in particular, depending on its structure, level of processing, and the volume of lipid released the fatty acids generated by lipolysis and the almond tissue matrix has been observed to differ significantly [42].

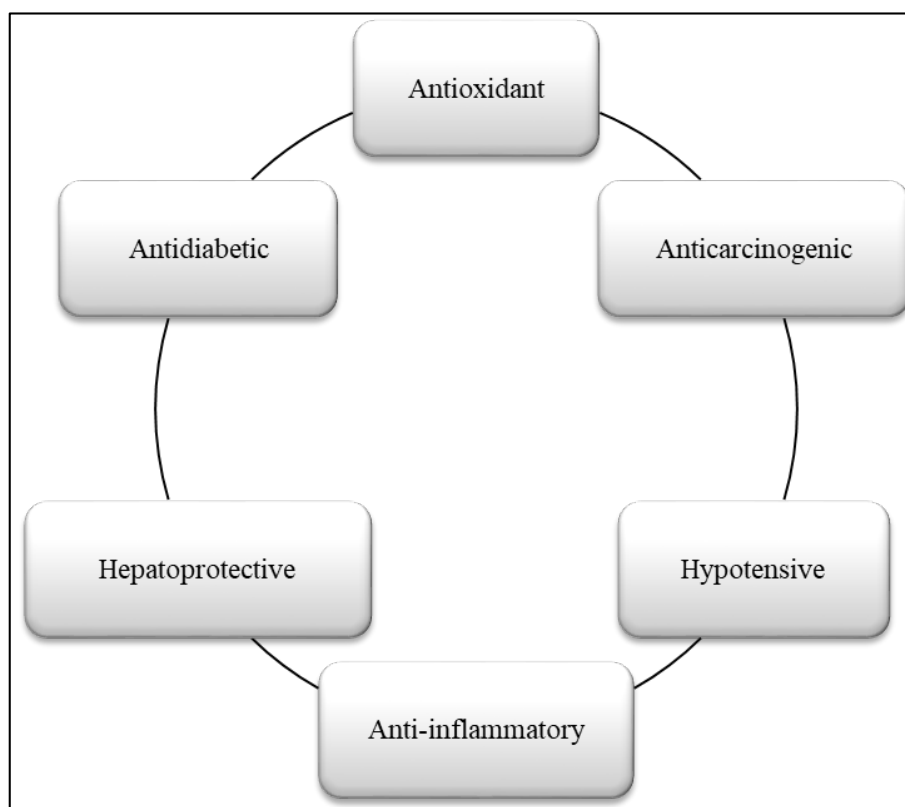


Diagram 2: Medicinal properties of pumpkin seeds.

Table 4: Proximate composition (%DM) of the whole seeds and kernels of pumpkin*

| Components | Seed | Kernel |
|---------------|------------|------------|
| Crude protein | 39.25±0.66 | 39.22±2.46 |
| Crude oil | 27.83±0.91 | 43.69±3.92 |
| Total ash | 4.59±0.16 | 5.14±1.23 |
| Crude fibber | 16.84±0.81 | 2.13±0.57 |
| Carbohydrate | 11.48±2.53 | 9.82±2.70 |

* Moisture content of seeds and kernels was 5.97±0.32 and 6.27±1.36, respectively

Table 5: Elemental nutrient composition (mg/100 g, DM) of pumpkin seed kernels

| Elements | Mean value | Reference |
|----------------|--------------|-----------|
| Calcium (Ca) | 139.70±4.19 | [4] |
| Copper (Cu) | 0.30±0.05 | |
| Iron (Fe) | 13.66±1.60 | |
| Magnesium (Mg) | 364.43±32.88 | |
| Phosphorus (P) | 1036.82±4.72 | |
| Potassium (K) | 753.11±33.29 | |
| Sodium (Na) | 68.58±16.85 | |
| Zinc (Zn) | 1.09±0.06 | |

History of Almonds

Due to "the grower's ability to develop gorgeous almonds from seed, almonds were one of the first domesticated fruit trees. Therefore, even though this plant cannot be propagated through suckers or cuttings, it might have been tamed before the invention of grafting [101]. The first evidence of domesticated almonds dates to the Early Bronze Age (3000–2000 BC), probably even earlier, as seen in the archaeological

sites of Numeira (Jordan) [57]. The almond is indigenous to Iran and its neighbours [62, 11]. It was dispersed by people along the coasts of the ancient Mediterranean enters southern Europe, northern Africa, and other places lately moved to other countries, particularly California, the United States [62]. The cultivated almond's wild counterpart grows in Levantine regions [101]. Choosing the sweet kind from the other bitter varieties found in the wild marked the start of domestication of almonds [57]. It is unknown which wild almond ancestor gave rise to the domesticated species. Due in part to the fact that it is indigenous to Armenia and western Azerbaijan, where it is believed to have been domesticated, the species *Prunus fenzliana* may be the most plausible wild progenitor of the almond. Early farmers cultivated wild almond species, "first accidentally in the rubbish heaps, and subsequently deliberately in their orchards" [31].

Nutritional value of Almonds

Almonds contain 50% fat, 21% protein, 22% carbs, and 4% water. A 100 gram me serving of almonds contains 579 calories. With 20% or more of the Daily Value (DV) or more of the B vitamins riboflavin and niacin, vitamin E, and the vital minerals calcium, copper, iron, magnesium, manganese, phosphorus, and zinc, almonds are a nutrient-dense meal. The B vitamins thiamine, vitamin B6, folate, choline, and potassium are all moderately abundant in almonds (10-19% DV). They also have a lot of dietary fibre, oleic acid, a monounsaturated fat, and linoleic acid, a polyunsaturated fat. Almonds include Phytosterols such beta-sitosterol, stigma sterol, campesterol, sitostanol, and campestanol, which are typical of nuts and seeds.

Table 6: Nutritional value per 100 g (3.5 oz)

| | |
|---------------------------------------|---------------------|
| Energy | 2,423 kJ (579 kcal) |
| Carbohydrates | 21.6 g |
| Starch | 0.7 g |
| Sugars | 4.4 g |
| Dietary fiber | 12.5 g |
| Fat | 49.9 g |
| Saturated | 3.8 g |
| Monounsaturated | 31.6 g |
| Polyunsaturated | 12.3 g |
| Protein | 21.2 g |
| Tryptophan | 0.213 g |
| Threonine | 0.598 g |
| Isoleucine | 0.702 g |
| Leucine | 1.488 g |
| Lysine | 0.580 g |
| Methionine | 0.151 g |
| Cysteine | 0.189 g |
| Phenylalanine | 1.120 g |
| Tyrosine | 0.452 g |
| Valine | 0.817 g |
| Arginine | 2.446 g |
| Histidine | 0.557 g |
| Alanine | 1.027 g |
| Aspartic acid | 2.911 g |
| Glutamic acid | 6.810 g |
| Glycine | 1.469 g |
| Proline | 1.032 g |
| Serine | 0.948 g |
| Vitamins Quantity % DV† | |
| beta-Carotene | 1 µg |
| lutein zeaxanthin | 1 µg |
| Vitamin A | 1 IU |
| Thiamine (B1) | 18% 0.211 mg |
| Riboflavin (B2) | 85% 1.014 mg |
| Niacin (B3) | 23% 3.385 mg |
| Pantothenic acid (B5) | 9% 0.469 mg |
| Vitamin B6 | 11% 0.143 mg |
| Folate (B9) | 13% 50 µg |
| Choline | 11% 52.1 mg |
| Vitamin C | 0% 0 mg |
| Vitamin D | 0% 0 µg |
| Vitamin E | 171% 25.6 mg |
| Vitamin K | 0% 0.0 µg |
| Minerals Quantity % DV† | |
| Calcium | 26% 264 mg |
| Copper | 50% 0.99 mg |
| Iron | 29% 3.72 mg |
| Magnesium | 75% 268 mg |
| Manganese | 109% 2.285 mg |
| Phosphorus | 69% 484 mg |
| Potassium | 15% 705 mg |
| Selenium | 4% 2.5 µg |
| Sodium | 0% 1 mg |
| Zinc | 32% 3.08 mg |
| The other constituent Quantity | |
| Water | 4.4 g |

• µg = micrograms • mg = milligrams • IU = International units † Percentages are roughly approximated using U.S. recommendations for adults.

Source: [91]

Nutritional and health benefits of Almonds in Functional spread

Almonds serve as a complete food rich in various beneficial nutritive and bioactive compounds like fatty acids, dietary fibers, micronutrients and phytochemicals. The growing number of human nutritional studies has showed that almonds

possess cholesterol lowering effect [40]. Numerous beneficial compounds present in almonds may be responsible for mediating the reduction in serum lipids. Almonds are rich source of omega-9 fatty acids, which have demonstrated beneficial effects on lipoprotein profiles [84, 2, 80, 47]. The proteins of almonds have an arginine-rich amino acid profile

that is regarded to be cardio protective in nature [54]. In addition to this, they are good sources of dietary fiber and phytochemicals, like plant sterols, which have been shown to contribute in reducing the risk of coronary heart disease [38, 89]. Almonds are also rich in tocopherols, especially alpha-tocopherol, and the latter has also demonstrated potent anti-atherogenic effects [89, 68].

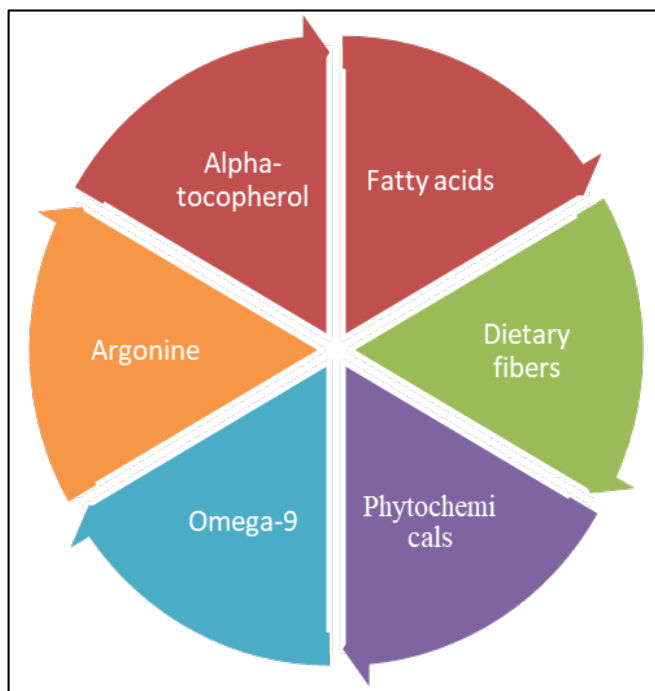


Fig 1: Composition of Almonds

Adoption of Natural sweetener in functional spread: Honey

Honey is obtained from nectar collected from plants, which is a sweet and viscous liquid. [94] Since ancient times, it has been utilized globally as a sweetener. [37] Traditionally, it is been use in food as a sweetening agent. The quality of honey mainly depends upon its place of origin, sensory perception and composition. Honey is a natural biological product comprising of sugars (glucose and fructose: 70-80%), water (10-20%) and other trace constituents such as organic acids, mineral salts, vitamins, proteins, phenolic compounds and free amino acids. [72] Naturally, honey consists of large amount of substances which includes amino acids, vitamins, minerals and enzymes, but it primarily comprises of sugar and water. Honey also contains small amount of enzymes. The main enzymes present in honey are Diastase, invertase and glucose oxidase, while catalase and acid phosphatase are present in trace amounts [95, 7]. Honey acts as antimicrobial, anti-inflammatory and anti-oxidant agent for boosting of the immune system [64].

History of Honey

The location and climate have an impact on the quality of the honey that is harvested. Production, physical qualities, chemical composition, utility, quality, and sensory features all play a role in the overall quality decisions, which are crucial. Historically, gathering honey was mostly limited to forests and other areas where bees would establish colonies. Chattering honey guide birds may direct persons, animals, and other wildlife to secret natural beehives by drawing their attention. In the future, the honey would be extracted from the combs. In the present day, bees are raised in boxes in an organised manner and use them as storage spaces [9].

Table 7: Physico-chemical characteristics of honey

| On the basis of floral source | |
|-------------------------------|---|
| Blended | Most honey that is marketed. It is a combination of two or more types of honey that are distinct in their floral source, colour, flavour, density, or place of origin. |
| Polyclonal honey | Wildflower honey, another name for polyfloral honey, is made from the nectar of several kinds of flowers. Taste, scent, and flavour vary according to the type of bloom that is present. |
| Mon floral | Mostly from the nectar of a particular kind of flower. Due to variations in their primary nectar sources, various monoclinal honeys have a unique flavour and colour. |
| Honeydew honey | Honeydew honey is less sweet than nectar honeys and has a very dark brown hue. It also smells strongly of stewed fruit or fig jam. |
| On the basis of processing | |
| Crystallized honey | Is honey in which a portion of the glucose content has spontaneously formed monohydrate crystals from solution? Additionally known as "granulated honey" or "candied honey" |
| Pasteurized Honey | Is honey that has undergone pasteurisation, which calls for temperatures of at least 72 degrees Celsius |
| Raw Honey | Is honey collected without the use of heat, either directly from the beehive or by extraction, settling, or filtering |
| Strained Honey | Has gone through a mesh material to filter out particle matter (wax flakes, propolis, and other flaws) but not pollen. |
| Filtered Honey | The honey that has been filtered to the point that the majority or all of the tiny particles, pollen grains, air bubbles, or other substances typically present in suspension have been eliminated. |
| Creamed Honey | Larger crystals from forming in uncooked honey are avoided by the abundance of little crystals present in creamed honey. |
| Dried Honey | When moisture is eliminated, totally solid, non-sticky granules are produced. |
| Ultrasonicated honey | processed with ultrasound (non-thermal processing) |

Source: [26, 63, 39]

Composition of honey

Natural honey is mostly composed of sugar and water, but it also includes significant amounts of amino acids, vitamins, minerals, and enzymes. A modest quantity of enzymes is present in honey. As catalase and acid phosphatase are only present in little quantity in honey, diastase, invertase, and glucose oxidase are the principal enzymes found there [94, 95]. Honey's main carbohydrates are glucose (28.54–31.3%) and

fructose (32.56–38.2%) [36]. Honey contains fructose and glucose in a 2.1:1.0 ratio as its sugars. Other sugars such sucrose, reducing disaccharides, and higher oligosaccharides are only in trace amounts [94]. Honey's shelf life is influenced by its water content, extraction period, and ripening process [3]. At temperatures between 40 and 100 degrees Fahrenheit (4 and 37 degrees Celsius), honey's water activity is between 16 and 18.3%. Honey contains a variety of trace elements and

minerals. traces of things like (Al, Ba, Sr, Bi, Sn, Te, Tl, W, Sb, Cr, Ni, Ti, V, Co, Mo) and essential minerals such as (P, S, Ca, Mg, K, Na, Zn, Fe, Cu, Mn) plays an important part in biomedical activities [85].

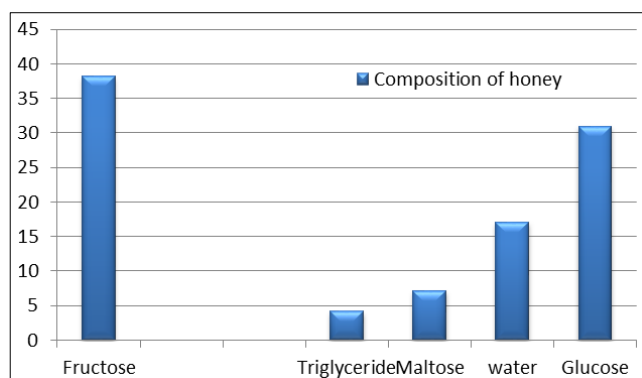


Fig 2: Composition of honey

Therapeutic value of Honey

[64] States that honey is a significant dietary item with medical significance. It is best recognized for its nutritional and therapeutic benefits. Additionally, the therapeutic value of a substance depends on a variety of factors, including sensory, chemical, physical, and microbiological features. The immune system is strengthened by honey's antibacterial, anti-inflammatory, and antioxidant properties.

Nutritional and health benefits of honey

Honey has various health advantages as far as nutrition and health are concerned since it has been used for therapeutic purposes to cure a wide range of disorders. In order to lessen the effects of several disorders, honey can be administered alone or in combination. The following have been proven to be among honey's health benefits. Around the world, honey from various sources is used successfully to treat wounds, skin ulcers, and digestive problems. It is confirmed that honey is approved as a medicinal product for use in professional wound treatment in Australia, Europe, and the United States. In Nigeria, items like ointments for the treatment of small burns and wounds also contain honey as an active component [96]. Additionally, honey encourages the formation of epithelial cells, which create the new skin layer that covers a healed lesion. Thus, even with very big wounds, avoids scarring and the development of wounds, and eliminates the necessity for skin grafting [86]. The primary benefit of honey is regulating inflammation, such as lowering pain [61].

Table 8: Vitamins and minerals content in honey

| Vitamins | Amount (mg/100g) |
|-----------------------|------------------|
| Ascorbic acid (C) | 2.2 - 2.5 |
| Pyridoxine (B6) | 0.01 - 0.32 |
| Pantothenic acid (B5) | 0.02 - 0.11 |
| Riboflavin (B2) | 0.01 - 0.02 |
| Thiamine (B1) | 0.00 - 0.01 |
| Phylloquinone (K) | 0.025 |

Source: [20]

Incorporation of dates as sugar replacement

One of the key problems that has reached a concerning level is obesity. According to a World Health Organization (WHO) report, 13% of adults in the population were obese in 2014 [71]. High sugar intake is one of the primary causes [6, 79, 21, 55, 98]. The direct relationship between sugar consumption and

obesity was established [23]. In response to public pressure to reduce daily sugar intake, empirical research on substitute sweeteners has grown significantly [14, 59, 45, 78]. A lot of customers are also being more careful and favouring modifications to lead healthier lifestyles. Because of their increased understanding of the importance of living a healthy lifestyle, individuals are more likely to choose foods that are sugar-free or low in sugar. According to Health Focus International's (2019) [88] findings, 45% of American consumers are actively looking for products and beverages that are sweetened with natural sweeteners. Additionally, the Compounded Annual Growth Rate (CAGR) from 2014 to 2018 for the worldwide market for low-sugar products indicates an increase of up to 17% [46]. Sugar, also known as sucrose, is now one of the most popular sweeteners used by food makers in their goods [48].

History of dates

Date palm fruits (Phoenix dactylifera), a tree said to be the oldest cultivated fruit plant of all plants in the world, are used to make date paste, an important culinary ingredient [93]. Date plants are known to be widespread in continents like Asia and Africa, notably in regions like the Nile River, Euphrates River, Senegal, and Indus rivers in northern India (Arabian nations), and Israel [67]. Due to their tremendous significance and usefulness in the sustaining of human existence, dates are now practically grown and consumed around the world. Nigeria began producing the plant in the 17th century, but it has only been used for subsistence due to a lack of knowledge about its nutritional potential [97].

Nutritional value of dates

Phoenix dactylifera produces more energy per kilogramme than cooked rice, ranking among the greatest energy producers: 1,800 Cal./kg, 2,224 Cal./kg for lean beef, 970 Cal./kg for bananas, and 480 Cal./kg for oranges. The fruits whose fleshy mesocarp is used to make date paste contain 2% protein, 2.5% fibre, and 70% carbohydrate, the majority of which is invert sugar (fructose and glucose), which is easily absorbed by the human body system without going through digestion (enzymatic actions) as is the case with regular sugars (sucrose). Iron (Fe), copper (Cu), zinc (Zn), silicon (Si), manganese (Mn), sulphur (S), phosphorus (p), magnesium (Mg), calcium (Ca), sodium (Na), chlorine (Cl), potassium (K), iron (Fe), copper (Cu), zinc (Zn), silicon (Si), manganese (Mn), and a very small amount of oil are all present in dates in varying amounts.

Therapeutic Benefits of dates

Dates are a strong source of vitamins A and B complex and have a high magnesium content (600 mg/kg), which may help prevent cancer. Because dates contain magnesium, those who consume dates in the Sahara region are reported to have the lowest cancer incidence rates. Mineral-rich dates are used to make a variety of dishes, including date paste, jam, nut rolls, sweetener, soft beverages, infant formula, liquid sugar, date butter, vinegar, and dates syrup. Because they contain tannin, date fruits are used therapeutically as a deterrent and astringent in the treatment of sore throats, colds, and bronchial catarrh. It is used to treat liver and stomach problems, edoema, gonorrhoea, cystitis, fever, and other conditions. Small-scale producers and indigenous business owners are put off by the intricacy of the industrial processes used to make white sugar, which is used as a sweetener. The

present research is focused on finding an alternative sweetener that will replace white sugar and has superior qualities because of the hazard chemically processed food poses to human health when ingested.

Flavouring ingredient of spread: Cocoa

Cocoa with high polyphenol content provides CVD prevention advantages [34]. One of the compounds in cocoa that is of interest is flavones (also known as flavan-3-ols or catechins) [28]. In a laboratory context, all polyphenols have an antioxidant effect, but this does not always mean that they have the same impact in people [100]. By using cocoa powder, a spread with practical chocolate flavour may be prepared.

Conclusion

The functional Spread prepared with the use of oilseeds such as sesame seed and sunflower seed has a creamy odour and acceptable texture. The spread is considered as a functional spread as it has the capability to impart numerous health benefits to humans and mostly the teens that have developed a habit to have spreads/butter/dips alongside the breakfast or snack dishes. It is way better than the spreads available in market which are prepared from high fat animal sources which are responsible to elevate the cholesterol levels in humans. The Functional spread on other hand tend to show positive effects on human health when taken in considerable amounts. It is regarded as healthy due to presence of beneficial ingredients in it. The ingredients inculcated in preparation of functional spread are sesame seeds, sunflower seeds, almonds, honey and cocoa powder. The oilseeds; sesame & sunflower seeds and nut; almonds are densely packed with antioxidants, Vitamin-E content and Tocopherol. Here sugars are not used as sweeteners which are considered to impart high calories to body, instead honey is utilized. To make it more acceptable and pleasant, cocoa powder is used for the chocolaty taste and feel. In a nutshell, the ingredients involved offer a nutritious contribution to the habitual diet, with potentially beneficial effects over spreads available in market made out of animal sources, making them a desirable food choice.

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