

# Seeds: What Is Important to Know to Help Patients Taking Medicines

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## Abstract

The article contains a list of 19 structured technical sheets on seeds that will serve as guidance in improving the quality of health of people. The used method was through an active search for literature that brought the observed aspects to the structuring of the technical sheets, *i.e.*, literature that contains data related to composition, active ingredients, interaction with medicines, health condition in which they may be useful in health care by various health professionals and anyone who may be of interest. The data obtained showed that there is a need for a careful evaluation of the seeds used by polymedicated people due to possible interactions and incompatibilities that may exist.

## Keywords

Seeds, Medicines, Healthcare, Quality of Life

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## 1. Introduction

According to Tesk (1997), the active principles of medicinal plants are substances synthesized by plants and stored for their growth; however, not all synthesized metabolic products have medicinal value [1].

The identification of metabolites of therapeutic interest continues to be an area of great importance for human health [2].

The World Health Organization (WHO) established in its report that changes in eating patterns, a decline in energy expenditure associated with sedentary lifestyle, an aging population—along with the use of tobacco and alcohol consumption—are the main risk factors for non-communicable diseases and represent a growing challenge for public health [3].

Seeds are very nutritionally rich foods that have many health benefits. The growing concern for the body, health and, well-being in general may be behind

the increase in seed consumption. Currently, there is a strong trend in favor of seed consumption, which reveals that they can contribute to the prevention of cardiovascular diseases, diabetes, and obesity, among others [4].

In general, seeds have high levels of fiber, vitamins, mineral salts, proteins, magnesium and numerous other components and the inclusion of seeds in the diet is a highly beneficial strategy to promote a greater intake of essential nutrients and maintain healthy eating habits. However, the amounts to be ingested depend on several factors according to individual needs. In addition, in polymedicated people it is necessary to pay greater attention considering that some seeds may interfere with the absorption of some administered drugs. In the context of health education, it is up to the population and health professionals to guide in relations to foods, in particular, seeds that may interact with medicines and the use that benefits the people.

The importance of including foods in a comprehensive manner is highlighted, as they contribute to healthy nutrition and the intake of essential nutrients for maintaining quality of life.

## **2. Objective**

The main goal was to develop technical sheets for nineteen seeds that may assist in the health of medicated individuals and they can be useful for health's professional orientations to the patient.

## **3. Method**

This was a study carried out through a bibliographical survey describing nineteen seeds to provide information on the composition of them, active ingredients, possible interactions with medicines, and, mainly, how they can contribute to improving the health.

It was not easy to find specific literature on the approach proposed in this article because the correlation has not been widely studied, hence the difficulty in finding related studies or clinical trials. Much of the information was taken from information made available on websites of companies that work with seeds. The issue of nutrition related to the rational use of medicines is a different topic because it addresses both the nutritional aspect and the issue of drug administration, and drug interactions of the most diverse types may occur that may harm or help pharmacotherapy.

The inclusion criteria were established based on the credibility of the company and the information provided based on literature. The exclusion criteria were selected based on whether the quality of the information was consistent or not and whether it met the objective of the text.

It was decided to present the seeds in alphabetical order of the scientific names considering that their uses are diverse, making it difficult to group them by use or by addressed disease.

The literature review was carried out from January to March 2025.

The choice of nineteen species was based on availability, medicinal value that adds nutritional characteristics to people and can be found in several countries.

Below are the individualized technical sheets and with key information on the use that may be included or not in diets for certain diseases.

## 4. Results

### ***Amaranthus cruentus* L. (Amaranthaceae)**

Among 60 - 70 species of Amaranthaceae, only three are grain-producing species and *Amaranthus cruentus* is one of them (it is a pseudocereal). It stands out for its significant chemical composition.

Chemical composition and active ingredients (from raw seeds) in 100 g [5]: Protein 13.56 g, Fatty Acids 7.02 g, Carbohydrates 65.25 g, Fiber 6.77 g, Vitamin B1 0.116 g, Vitamin B2 0.2 mg, Vitamin B3 0.923 mg, Vitamin B6 0.591 mg, Folate 82 mcg, Vitamin E 1.19 mg, Vitamin C 4.2 g, Potassium 508 mg, Calcium 159 mg, Magnesium 248 mg, Iron 7.61 mg, Phosphorus 557 mg, Zinc 2.87 mg, Selenium 18.7 mcg.

Chemical composition and active ingredients (of cooked seeds) in 100 g [6] [7]: Protein 4 g, Fatty Acids 2 g, Carbohydrates 19 g, Fiber 2 g, Vitamin B1 0.116 g, Vitamin B2 0.2 mg, Vitamin B3 0.923 mg, Vitamin B6 0.591 mg, Folate 82 mcg, Iron 2.1 mg, Manganese 0.85 mg, Calcium 47 mg, Magnesium 65 mg, Phosphorus 148 mg, Potassium 135 mg, Zinc 0.9 mg, Pantatenic Acid < 0.1 mg, Vitamin B6 0.11 mg, Folic Acid 22 mcg, Thiamine < 0.1 mg, Riboflavin 0.02 mg, Niacin 0.24 mg. Total amounts of Omega 6 and Omega 3 fatty acids as 315.9 mg/g and 6.96 mg/g, respectively. The squalene content in amaranth seeds ranges from 3.20% to 5.80% of the total fatty acids, depending on the species and place of cultivation.

Drug interaction/Contraindication [7] [8]: Despite being a food with several benefits for the body, there are some situations in which the consumption of amaranth should be evaluated, such as: diabetics (as it has a high glycemic index, amaranth should be consumed in moderation by diabetics or people prone to developing the condition), people with kidney disease (the high concentration of protein present in the food can overload the kidneys). Amaranth seeds contain non-nutritive substances such as Trypsin and Chemotrypsin inhibitors, Phenolic Compounds including Saponins and Tannins, Phytates and Phyto hemagglutinins. Its content is different, the same or less than in cereal grains or other raw materials. They usually have double action and meaning, both negative and positive, for example, strengthening the body's resistance functions or playing the role of natural antioxidants. The least desirable non-nutritive substance in amaranth seed is Saponin (saponin glycosides). Saponins irritate the digestive tract and, after entering the bloodstream, cause hemolysis. Furthermore, they inhibit acetylcholinesterase, which results in disturbances in the transmission of nerve stimulation.

Conditions that it can help [8]-[10]: Reduces cholesterol and the Phytosterols and Dietary fibers present in amaranth help control cholesterol by facilitating its excretion. It helps with weight loss because it has few calories and generates a

feeling of satisfaction due to its high amount of fiber. It prevents osteoporosis and, as it is a rich source of calcium, phosphorus, magnesium and manganese, amaranth helping to prevent bone loss. Amaranth products are recommended for the elderly, pregnant women and people with anemia or bone disorders. Doses of 2000 to 5000 mg per day are considered therapeutic against cancer, and the risk of bowel, breast and skin cancer decreases. Squalene is capable of reducing the growth of tumor cells and making existing tumors shrink. In recent years, the protective role of Squalene has been demonstrated against a number of carcinogens that cause, for example, hairy cell leukemia and skin cancer. Squalene also strengthens the effect of antineoplastic agents such as Adriamycin, 5-Fluorouracil and Bleomycin. Including Alkylglycerols and Omega-3s, Squalene has a beneficial effect on the natural immune system and may be useful in treating diseases associated with impaired immune function.

#### ***Avena sativa* L. (Poaceae)**

Oats are an annual grass that can be used in food in the form of flour or bran.

Chemical composition in 100 g [11]: Total carbohydrates 16.1 g, Protein 4.18 g, Lipids 2.31 g; Dietary fiber 4.11 g.

Active ingredients [12]: Beta-glucans ( $\beta$ -Glucan): are fibers that are structural components of the cell walls of cereals.

Interaction with medications [13]: The fiber in oatmeal and other cereals, when consumed in large quantities, can interfere with the absorption of digoxin.

Conditions that it can help [12]: It is a good source of soluble fiber rich in B-Glucan, which works to improve insulin sensitivity, maintaining glycemic control. Furthermore, it has a low glycemic index and reduces glycemic spikes after meals. In dyslipidemia, the beta-glucans present in the cereal reduce cholesterol in individuals with hypercholesterolemia. It works to reduce low-density lipoprotein (LDL) and increase high-density lipoprotein (HDL). Due to their high fiber content, cereal bran, including oats, has been gaining ground in the treatment of constipation.

#### ***Bertholletia excelsa* Bonpl. (Lecythidaceae)**

Known by different names, such as Brazil nut, Brazil nut or Amazon nut, it is one of the most appreciated and consumed seeds in Brazil.

Chemical composition in 100 g [14]: Total fat 66g, Saturated fat 15 g, Carbohydrates 12 g, Proteins 13 g and Dietary fiber 7.5 g.

Active ingredients [15]: Source of unsaturated fatty acids and selenium. The concentration of selenium in Brazil nuts ranges from 8 to 83 mcg/g and is among the highest found in foods consumed by humans.

Drug interaction/Contraindication [16]: Excessive consumption of the seed can be harmful to health, mainly due to the amount of selenium present in the seed, which can be toxic if consumed in large quantities because it can result in adverse health problems, including symptoms such as hair and nail loss, skin lesions, nervous system disorders and even paralysis.

Conditions that it can help [17]: Improvement in antioxidant status through increased selenium levels and/or glutathione peroxidase activity in plasma, serum,

whole blood and/or. Furthermore, healthy individuals had improved lipid markers and fasting blood glucose. Individuals with obesity had an improvement in markers of lipid metabolism. Individuals with type 2 diabetes mellitus or dyslipidemia have improved oxidative stress or DNA damage. Individuals undergoing hemodialysis benefited greatly from consumption, as markers of lipid profile, oxidative stress, inflammation and thyroid function improved. Older adults with mild cognitive impairment have improved verbal fluency and constructional praxis, and controversial results regarding change in a marker of lipid peroxidation have been observed in individuals with coronary artery disease.

***Bixa orellana* L. (Bixaceae)**

Known mainly for the dye extracted from its seeds (paprika), annatto is used in Brazilian cuisine and in various industries, such as textiles, pharmaceuticals, food, cosmetics, among others.

Chemical composition in 100 g of seed [18] [19]: Vitamin A 15 g, Phosphorus 10 mg, Calcium 7 mg, Vitamin C 2 mg, Iron 0.8 mg, vitamins B1, B2 0.05 mg, B3 0.03 mg. Also present are Linoleic acid 19.5%, Palmitic Acid 15.5%, Oleic Acids 8.1%, Stearic Acids 7.1% and arachidonic acid 2.4%.

Active ingredients [19] [20]: Tocotrienol (component of vitamin E), Geranylgeraniol (synthesis of vitamin K): important in the synthesis of several vitamins (e.g. vitamin K), hormones and carotenoids.

Drug interactions [21]: attention must be paid when using medications that contain vitamin E in their capsules (e.g., Selumetinib), oral solution (e.g., Tipranavir) or supplements, so as not to exceed the levels of the vitamin in the body.

Conditions that it can help [22] [23]: The antioxidants in the seeds help neutralize free radicals, which can damage cells and lead to the development of chronic diseases such as cancer, brain disorders, heart disease and diabetes. Annatto seeds can help prevent various diseases such as atherosclerosis, cardiovascular and degenerative diseases: due to the principle of diseases, they protect the body's cells against free radicals. It has antimicrobial properties, induces cell death in cancer cells, helps promote eye health, can protect against heart problems and reduces markers of inflammation.

***Carica papaya* L. (Caricaceae)**

Coming from the tropical regions of the Americas, probably from the southern region of Mexico and adjacent regions of Central America.

Chemical composition in 100 g [24]: The seed is a rich source of Proteins (27.8% non-defatted, 44.4% defatted), Lipids (28.3% non-defatted) and Crude Fiber (22.6% non-defatted, 31.8% defatted). Glucosinolates occur in the highest proportion and the seed has a low amount of free monosaccharides. Sucrose is the predominant sugar (75.0% of total sugars). Mineral content is generally low. However, Calcium and Phosphorus occur in appreciable quantities (17,340 mcg/g and 10,250 mcg/g, respectively). The seed oil is low in iodine (74.8), free fatty acids (0.94%) and carotene (0.02 mcg/g). The main Fatty Acid is C18:1 (79.1%).

Active ingredients [25]: vitamins, minerals, enzymes, proteins, alkaloids, glyco-

sides, fats, oils, saponins, flavonoids, sterols. Benzylglucosinolate is a glycoside that belongs to the group of glucosinolates and Benzyl Isothiocyanate (product of its hydrolysis).

Drug interaction [26]: *Carica papaya* contains nephroprotective phytochemicals and may be useful in preventing acetaminophen-induced kidney damage.

Conditions that it can help [25]-[27]: *Papaya* seeds are a source of the compound Benzyl Glucosinolate, which is a precursor of benzyl isothiocyanate that has action against the H69 lung cancer cell and can inhibit the development of pancreatic cancer. Mainly in oxyuriasis larvae, Benzyl Isothiocyanate and the oil contained in the seed exert an action by inhibiting the parasite's metabolism, affecting its motor activity and forming lesions. The biological properties of papaya parts indicated that seed extracts and isolated compounds showed bacteriostatic properties against *S. aureus*, *E. coli*, *Salmonella*, *Bacillus subtilis* and *Entamoeba histolytica*. The seeds stimulate menstruation, or can cause abortion, which is why it is contraindicated for pregnant women.

#### ***Chenopodium quinoa* Willd (Amaranthaceae)**

Quinoa originates from the Andes and can be sold in different presentations.

Chemical composition in 100 g [28]: Proteins 15 g, Carbohydrates 68 g, Iron 9.5 mg, Phosphorus 286 mg, Calcium 112 mg and Fibers 5 g. The composition may vary slightly, due to the diversity of seeds.

Active ingredients [29]: Quinoa has a high content of Proteins and Essential Amino Acids (Lysine, Isoleucine and Threonine), important in the processes of formation, maintenance and regeneration of muscle tissue. Quinoa also contains minerals such as calcium, zinc and phosphorus, antioxidant substances that promote the removal or inactivation of free radicals.

Drug interaction [30]: The concomitant use of levodopa and foods rich in proteins or amino acids may result in decreased drug concentrations.

Conditions that it can help [29]: Quinoa has antioxidant action that attacks free radicals and helps prevent heart disease. Omega 3 and omega 6 fatty acids can help prevent cardiovascular diseases, quinoa antioxidants also help reduce cancer risk by inhibiting oxidative damage to DNA.

#### ***Citrullus lanatus* (Thunb.) Matsum. & Nakai (Cucurbitaceae)**

Watermelon is a fruit native to the tropical regions of Equatorial Africa. Watermelon fruit is consumed fresh (eaten directly or in fruit salad) or is processed as juice, jelly, pickled rind. However, the seeds are also eaten [31].

Chemical composition in 100 g [32]: Proteins 28.33 g, Carbohydrates 15.31 g, Lipids 47.37 g, main component of the food. The predominant fatty acids in watermelon seed oil are Linoleic Fatty Acid 28.1 g, Oleic 7.3 g, Palmitic 5.4 g and Stearic 4.2 g.

Active ingredients [33] [34]: Phenolic acids: Hydroxybenzoic and Hydroxycinnamic Acids stand out. Flavonoids: Rutin and Quercetin, in addition to Saponins, Alkaloids and Terpenoids (Cucurbitacins) and Citrulline, which is converted to Arginine.

Conditions that it can help [31] [35]: Anti-inflammatory effect is due to the inhibition of nitric oxide production in macrophages by Cucurbitacins. Ability to regulate blood pressure because the seeds have a sodium/potassium (Na/K) ratio less than 1, which can reduce blood pressure. Benefit in relation to blood glucose; prevents the onset of diabetes. Reduction in fasting glycemic level and increased urine production. Cardioprotective: Prevention of cardiovascular diseases. Antioxidant Properties: Helps reduce the production of free radicals.

#### ***Cucurbita máxima* Duchesne (Cucurbitaceae)**

It is an annual warm-season vegetable climbing plant in the Cucurbitaceae (cucumber) family native to South America. Pumpkin seed, also known as pepita, is a small edible grain found inside the pumpkin. It can be consumed raw, roasted, ground or as an oil.

Chemical composition in 100 g [36] Protein 21.4%, Lipids 28.8% and Dietary fiber 15.3%. The total Vitamin E content was 20.3 mg/100 g, with 1.3 mg of Alpha-tocopherol and 18.7 mg of  $\gamma$ -tocopherol. The predominant fatty acid was linoleic (47.7%).

Active ingredients [37] [38]: Polyunsaturated fatty acids (Linoleic Acid), Tocopherols and Sterols, Polyunsaturated Fatty Acids (Linoleic Acid), Tocopherols and Sterols. The oil is rich in many bioactive components such as Fatty Acids, Essential Amino Acids, Vitamins, Phytosterols, Tocopherols, Squalene and Carotenoid pigments.

Drug interactions/contraindications [39] [40]: Those with kidney problems should monitor their phosphorus intake, as the seed is rich in this mineral. Due to their high fiber content, pumpkin seeds can cause gastrointestinal discomfort if consumed in large quantities, such as gas, bloating and, in some cases, even diarrhea or constipation. Pumpkin seed oil can interact with certain medications, such as anticoagulants, and because it contains Omega 3 fatty acids, it can increase the risk of bleeding. Care must be taken when consuming pumpkin seeds concomitantly with the use of anticoagulants, antihypertensives, diuretics, lithium and immunosuppressant, as the compounds present in the seed can exacerbate the effects of these medications.

Conditions that it can help [41]: Lioneic Acid is a polyunsaturated fatty acid, which has been shown to reduce serum cholesterol, found in up to 50% of the seed's total lipids. Tocopherol (which has vitamin E activity) has antioxidant properties, reducing free radicals arising from oxidative processes in cells. Another component with similar action is carotenoids, which have pro-Vitamin A activity, also contributing to night vision, development of epithelial tissue and the immune system. Pumpkin seeds are rich in bioactive compounds, such as Phytosterols, Lignans and Cucurbitacins, which can reduce prostate inflammation and modulate estrogen levels, reducing the risk of progression to cancer. It also works to prevent and improve the symptoms of Benign Prostatic Hyperplasia.

#### ***Helianthus annuus* L. (Asteraceae)**

The sunflower is a plant native to the Americas and was domesticated by North American indigenous peoples. Its seed is used to extract sunflower oil and con-

sumption, both of the oil and the seed, has currently increased.

Chemical composition in 100 g [42]: Protein 20.78 g, Total fat 51.46 g, Carbohydrate 20 g, Dietary fiber 8.6 g, Monosaccharides 2.62 g, Calcium 75 mg, Iron 5.25 mg, Magnesium 325 mg, Phosphorus 660 mg, Potassium 645 mg, Sodium 9 mg, Zinc 5 mg, Vitamin C 1.4 mg, Thiamine 1.48 mg, Riboflavin 0.355 mg, Niacin 8.335 mg, Vitamin B6 1.345 mg, Folic Acid 227 mcg, Vitamin A 3 mcg, Vitamin E 35.17 mg, Saturated fats 4.455 g, Monounsaturated fats 18,528 g, Polyunsaturated fats 23,137 g.

Active ingredients [42] [43]: Fat-soluble vitamins: mainly vitamin E (Tocopherol), Unsaturated Fatty Acids: highlighting Linoleic Acid (polyunsaturated) and Oleic Acid (monounsaturated).

Drug interaction [44]-[46]: Be careful if you use medications with Vitamin E, as taking too much of this vitamin can cause bleeding. Furthermore, there are no reports of drug interactions with the consumption of sunflower seeds. But it is important to pay attention to possible allergies, as cases of patients allergic only to sunflower seeds are described in the literature, especially when consumed roasted/toasted, without having previously presented other allergies. Serum concentration of vitamin E may be increased when combined with abametapir. Abciximab Vitamin E may increase the antiplatelet activities of Abciximab. Abemaciclib—The metabolism of Abemaciclib may be increased when combined with vitamin E. Acalabrutinib—The metabolism of Acalabrutinib may be increased when combined with vitamin E. Acenocoumarol—Vitamin E may increase the anticoagulant activities of acenocoumarol.

Conditions that it can help [43] [47]-[49]: Antioxidant action and cellular protection: as a food rich in Vitamin E and Selenium, the consumption of sunflower seeds helps protect cells against free radicals. Cardiovascular protection: as it has significant amounts of unsaturated fatty acids that are associated with the prevention of cardiovascular diseases. Wound healing oil: due to its composition rich in Vitamin E and Fatty Acids, sunflower seed oil can be used to aid wound healing, especially in patients with diabetes. Benefits in the intestinal tract: with more than 8 g of dietary fiber per 100 g of sunflower seeds, its consumption can affect the speed of intestinal transit, the pH of the colon and provide other positive benefits associated with the consumption of dietary fiber.

#### ***Linum usitatissimum* Linn. (Linaceae)**

Flaxseed is a small, light brown seed derived from the plant *Linum usitatissimum*, also known as flax. It can be consumed whole, ground or in oil form, and is often added to foods such as yogurts, cereals and smoothies due to its health benefits.

Chemical composition in 100 g [50]: Total Fat 42 g, Sodium 30 mg, Potassium 813 mg, Carbohydrates 29 g, Dietary Fiber 27 g, Proteins 18 g, Calcium 225 mg, Vitamin B6 0.5 mg, Omega 3 6.3 g and Magnesium 392 mg.

Active ingredients [51] [52]: Lignans: are secondary metabolites produced by plants and are generally associated with defense against the action of pathogens.

Omega 3: is a class of fatty acids essential for the human body. The benefits of consuming Omega-3 include promoting cardiovascular, brain and eye health, as well as having anti-inflammatory properties and contributing to proper brain and eye development in children.

Drug interaction [53]: There is no drug interaction.

Conditions that it can help [54] [55]: Blood sugar control: Consuming flaxseed regularly can help stabilize blood sugar levels, making it an excellent option for people looking to control diabetes or prevent insulin resistance. Cholesterol control: The soluble fibers found in the seed help eliminate excess cholesterol, contributing to cardiovascular health and preventing heart disease. Improves blood pressure: some studies suggest that including flaxseed in the diet can help reduce blood pressure, as it contributes to the health of the circulatory system. Cancer prevention: Flaxseed has been investigated for its possible protective effect against cancer.

#### ***Papaver rhoeas* L. (Papaveraceae)**

The poppy seed is small, generally rounded or oval in shape, ranging in size from 1 to 2 millimeters in diameter. It has a smooth, hard surface, with a color that can be dark brown to black, depending on the poppy variety. The seeds are rich in essential oils and are used both in cooking and in the production of oils and cosmetic products.

Chemical composition in 100 g [56] Carbohydrate 28 g, Protein 18 g, Total fat 42 g, Magnesium 347 mg, Calcium 1438 mg, Dietary Fiber 20 g and Iron 9.8 mg.

Active ingredients [57] [58]: Unsaturated Fats, such as Fatty Acids (Omega-3 and Omega-6), Proteins, Fiber and small amounts of Vitamins and Minerals.

Drug interactions [58]: The seeds can interact with some medications, such as anticoagulants or anti-inflammatories.

Conditions that it can help [58] [59]: Hyperglycemia: As it contains a high fiber content, both the absorption and digestion of carbohydrates occur more slowly, reducing blood glucose spikes. The fats present also help this process by increasing insulin sensitivity. Anti-inflammatory action: The fatty acids and antioxidants present have anti-inflammatory action and reduce the production of pro-inflammatory substances in the body. Improved cognitive performance: the fatty acids, alkaloids and minerals present in the seed help with cognitive performance. They help with intestinal functioning: the fibers present in the seeds improve peristalsis and the formation of fecal cake. Bone benefits: Because it has a high calcium content, poppy seeds can increase bone mineral density, reducing the risk of problems such as osteoporosis.

#### ***Passiflora edulis* Sims (Passifloraceae)**

It is found in Brazil, Colombia, Peru, Ecuador, Bolivia and Paraguay, although there are native species in countries ranging from the United States to Argentina, as well as Asia, Australia and China. It is an ovoid-shaped fruit whose pulp has a yellowish gelatinous appearance, a strong fragrance and is rich in arils, that is, a fleshy covering that surrounds the seeds.

Chemical composition in 100 g [60] [61]: Water (moisture) 6.89 g, Proteins 12.57 g, Lipids 28.12 g, Ash 1.47 g, Carbohydrates 13.19 g.

Active ingredients: Essential Fatty Acids, Triterpenes, Steroids, Alkaloids, Flavonoids, Carotenoids, Minerals, Vitamin A and Vitamin C [62].

Drug interaction [63] [64]: It should not be ingested in large quantities by people undergoing treatment with sedatives and central nervous system depressants, such as Barbiturates, Benzodiazepines and Opiates. It may interact with Warfarin, as it has potential anticoagulant action. It may cause an additive effect with monoamine oxidase inhibitor drugs (Isocarboxazid, Phenelzine and Tranylcypromine).

Conditions that it can help [65]: It has anti-inflammatory, neuroprotective, antitumor, anti-diabetic, antioxidant and sedative effects. The presence of  $Fe^{2+}$  ions, which have a chelating effect, of phenolic compounds and fibers, makes it possible to reduce oxidative stress, preventing damage to cells and tissues. The fruit is effective in inhibiting pro-inflammatory factors and cytokines, in addition to limiting the migration of leukocytes, resulting in reduced inflammation. Compounds present in passion fruit seeds reduce the death of neurons. Orientin stimulates cellular control, preventing uncontrolled cell proliferation and promoting apoptosis (cell death), when necessary, which reduces the chances of a tumor appearing. Piceatannol is a chemical compound present in passion fruit seeds with antimicrobial activity. The seeds are rich in linoleic acid, which is important in preventing atherosclerosis, hypercholesterolemia and dyslipidemia.

#### ***Persea americana* Mill. (Lauraceae)**

Native to the Americas, it has a rounded shape and a greenish color when not ripe. It has a single seed, spherical and large.

Chemical composition in 100 g [66] [67]: After preparation of avocado seed flour, it presents: Moisture 10.91%, Ash 2.22%, Crude protein 4.57%, Ethereal extract 3.38%, Dietary fiber 15.12% (soluble and insoluble fiber) and, for the most part, 63.8% Carbohydrates. In the Hass avocado variety, one of the most consumed in the world, we find in the composition of its seed: Moisture 54.1%, Ash 1.2%, Proteins 2.4%, Sugars 3.5%, Starch 27.5% and Fat 0.8%.

Active ingredients [66]-[68]: Macrominerals (Potassium, Calcium, Phosphorus, Magnesium, Nitrogen) and Microminerals (Iron and Zinc). The seed is rich in phenolic compounds, especially Catechin, Succinic Acid, Chlorogenic Acid and Vanillic Acid, anti-inflammatory and antioxidant substances that are very beneficial for health.

Drug interaction [66]: It should not be used with Monoamine Oxidase Inhibitors (MAOIs), such as Isocarboxazid and Moclobemide, as it can trigger hypertensive crises. Consumption associated with anticoagulants may increase the risk of bleeding. In case of adverse events, discontinue use immediately.

Conditions that it can help [67]: Currently, the avocado seed, which is treated as waste, has already proven anti-inflammatory and antioxidant effects. Seed extracts also showed antidiabetic potential, with a considerable reduction in blood

glucose levels. Some studies also show favorable results for the use of avocado seed extract in the treatment of hypertension and cholesterol control. More recent studies also point to the antimicrobial and antifungal potential of methanolic and ethanolic extracts from avocado seeds.

***Phaseolus vulgaris* L. (Fabaceae)**

It is one of the main components of the diet, especially in Brazil. There is a wide variety of beans, the most consumed being common beans and cowpeas.

Chemical composition in 100 g [69]: After cooking, carioca beans (*Phaseolus vulgaris* L.) have: Moisture 80.4%, Ash 0.7%, Protein 4.8%, Lipids 0.5%, Amino acids 13.6%, of which 8.5% are total dietary fiber.

Active ingredients [70]: Bioactive Peptides, Phytosterols, Isoflavones, Saponins, Bioactive Carbohydrates, Lysine Amino Acid, Carbohydrates (mainly Starch), Minerals (Iron and Zinc), B vitamins.

Drug interactions [71]: Delay the absorption of Digoxin, used to treat heart failure.

Conditions that it can help [72]-[74]: Cardiac protective, hypolipidemic and hypoglycemic effects, contributing to the reduction of weight and body fat, in addition to reducing the prevalence of Chronic Non-Communicable Diseases (NCDs), such as type 2 diabetes. Source of the amino acid Lysine, which the body cannot synthesize on its own, therefore, it is essential to consume beans to obtain this essential amino acid. Antimicrobial, hypotensive and antioxidant effects, due to the presence of Bioactive Peptides.

***Pimpinella anisum* L. (Apiaceae)**

Native to the Mediterranean region, western Asia and Europe, it is a dried fruit, commonly called a seed, popularly used in the form of tea to treat respiratory and digestive problems.

Chemical composition in 100 g [75]: Carbohydrates 50 g, Proteins 17.6 g; Fiber 14.6 g, Total lipids 15.9, Calcium 646 mg, Iron 37 mg, Magnesium 170 mg, Phosphorus 440 mg, Sodium 16 mg, Zinc 5.3 mg, Copper 0.91 mg, Manganese 2.3 mg, Selenium 5 mcg, Vitamin C 21 mg, Thiamine 0.34 mg, Riboflavin 0.29 mg, Niacin 3.06 mg, Pantothenic Acid 0.797 mg, Vitamin B6 0.65 mg, Folate 10 mcg, Vitamin A 15 mcg, Total Saturated Fatty Acids 0.586 g, Monounsaturated Fatty Acids 9.78 g, Polyunsaturated Fatty Acids 3.15 g.

Active ingredients [76] [77]: The main component is the essential oil Anethole (90% - 95% of the chemical composition). Its mechanism of action is not yet completely understood. However, there is evidence that Anethole acts via GABAA and NMDA receptors when used as an anticonvulsant, in addition to inhibiting the production and/or secretion of inflammatory mediators such as IL-1, prostaglandins, NO, IL-17 and TNF.

Drug interaction [78]: High doses may interfere with anticoagulant drugs or monoamine oxidase (MAO) inhibitors. Estrogenic effects may interfere with hormone replacement therapy and contraceptive pills (only evident in high doses).

Conditions that it can help [78] [79]: According to the Committee on Herbal

Medicinal Products (HMPC), fennel can be used in the symptomatic treatment of complaints of mild gastrointestinal spasms, including bloating and flatulence, in addition to coughs associated with a cold. There is evidence that this herbal medicine has other pharmacological actions such as galactagogue, antifungal, antiseptic, antiviral, antioxidant, estrogenic, mucolytic and sedative action, in addition to promoting iron absorption and having a moderate anthelmintic action. The chemical components Eugenol and Estragol have anesthetic, hypothermic, muscle relaxing and anticonvulsant effects.

***Plantago ovata* Forsk. (Plantaginaceae)**

Psyllium is a natural fiber derived from the seed husks of the *Plantago ovata* plant. It is often used as a dietary supplement due to its high soluble fiber content. When ingested, Psyllium absorbs water and forms a gel.

Chemical composition in 100 g [80]: Carbohydrate 83 g, Protein 6 g, Total fat 2 g and Dietary fiber 78 g.

Active ingredients [81]: Psyllium has a high content of dietary fiber, which absorbs large amounts of water and, for this reason, has a regulating effect on intestinal activity, increasing the volume and humidity of feces and stimulating bowel movements.

Drug interaction [82]: Due to its high amount of fiber, it is recommended to take Psyllium 30 to 120 minutes before or after taking the medication, in order to avoid interference with the absorption of medicinal substances.

Conditions that it can help [81]: Due to the expansion of its volume when hydrated, Psyllium helps with the feeling of satiety; because it contains soluble fibers, Psyllium helps the intestinal flora, as well as the formation of moist feces and intestinal peristalsis, in the control of glycemia and triglycerides (its fibers delay the absorption of fats and sugars by the body, improving peripheral insulin resistance by 42%).

***Salvia hispanica* L. (Lamiaceae)**

*Salvia hispanica* L. was used along with corn, beans and amaranth by ancient Mesoamerican cultures—Aztecs and Mayans—in the preparation of medicines and popular foods. In pre-Columbian societies, it was the second main crop after beans. In Aztec communities, chia was used for food, cosmetics and religious rituals.

Chemical composition in 100 g [83]: Carbohydrates 42 g, Protein 17 g, Fat 31 g, Magnesium 335 mg, Phosphorus 860 mg, Calcium 631 mg, Potassium 407 mg, Sodium 16 mg, Vitamin A 54 mcg, Vitamin E 0.5 mcg, Vitamin C 1.6 mcg, Thiamine 0.62 mcg, Riboflavin 0.17 mcg, Niacin 8.83, Linolenic Acid 63.69 g, Linoleic Acid 18.89 g, Oleic Acid 7.3 g, Palmitoleic Acid 0.03g, Palmitic Acid 7.04 g, Caffeic Acid 27 mcg, Quercetin 0.17mcg, Kaempferol 0.013 mcg, Daidzein 6.6 mcg, Glycitin 1.4 mcg and Genistin 3.5 mcg.

Active ingredients and functional compounds [84]: Chia seeds contain healthy  $\omega$ -3 Fatty Acids, Polyunsaturated Fatty Acids, Dietary Fiber, Proteins, Vitamins and some Minerals. Furthermore, the seeds are an excellent source of polyphenols

and antioxidants, such as Caffeic Acid, Rosmarinic Acid, Myrcetin, Quercetin and others.

Drug interaction [85]: Diabetes: Due to the high amount of fiber in chia, which slows the absorption of sugar into the blood, eating too many seeds may require adjustments in the dosage of diabetes medications due to the risk of hypoglycemia. But it is important to highlight that chia, in general, is considered favorable for diabetics, because the gel it forms absorbs sugar more slowly. - High triglycerides: as chia is rich in carbohydrates and fats—even though the majority of it is polyunsaturated, it can promote an increase in these levels of fat in the blood, especially in those who are already prone to the problem. Diverticulosis: in this condition, the intestine forms small pockets where smaller foods, such as grains and seeds, can enter and cause inflammation (so-called acute diverticulitis). - Use of anticoagulants: Omega-3 from chia also has anticoagulant potential, so people who use these medications should avoid consuming the item due to the risk of enhancing this effect. - Allergies: anyone who is allergic to mustard, linseed or sesame seeds should also avoid chia, due to the risk of cross-allergic reaction. - Dysphagia: difficulty swallowing and swallowing increases the risk of dried chia becoming hydrated before reaching the stomach, causing occlusion. The ideal is to always consume the seed already hydrated or avoid drinking any liquid after consuming chia.

Conditions that it can help [84] [86]: The phenolic compounds in chia have antioxidant properties, which prevent oxidative stress and cell damage. In this way, they help prevent cancer, diabetes and inflammation, in addition to Parkinson's and Alzheimer's disease. Polyunsaturated fatty acids contribute to the prevention of cardiovascular diseases. Fiber helps regulate intestinal function and plays an important role in the dietary treatment of various conditions, in addition to preventing hypertension.

#### ***Sesamun indicum* L. (Pedaliaceae)**

It is considered to originate from the tropical part of Africa and Asia. It was introduced to Brazil by the Portuguese, via Indian colonies, in the 16th century.

Chemical composition in 100 g [87]: Proteins (18.6%), Lipids (52%), Total Carbohydrates (21.6%), Total Fibers (6.3%), Ash (5.3%), Calcium (1160 mg), Phosphorus (616 mg), Iron (10.5 mg), Sodium (60 mg), Potassium (725 mg), Vitamin A (30 IU), Thiamine (0.98 mg), Riboflavin (0.23 mg) and Niacin (5.4 mg).

Active principles/functional elements [88]: Lignans (Sesamine and Sesamolina), b-Sitosterol, Campesterol and up to 98% oil, consisting mainly of glycerides of Oleic and Linolenic Acids, Proteins, Vitamins, Minerals and trace elements such as Calcium, Phosphorus, Iron, Magnesium, Copper, Chromium; Mucilages.

Drug interaction [89]: Sesame, as it is a source of phytic acid, should not be taken concomitantly with calcium supplements and interferes with the absorption of zinc, calcium, magnesium and iron. Furthermore, it should not be taken together with medications that require fasting, for example, alendronate sodium, captopril, levothyroxine sodium.

Conditions that it can help [90]: Sesame oil is associated with reducing hypertension and the seeds contain magnesium, which acts as an important vasodilator. The seeds contain phytate, which is an antioxidant, acting to prevent cancer. It has an action in regulating blood glucose levels. Contains important minerals, such as calcium, zinc and phosphorus, contributing to bone health and preventing osteoporosis. It has fiber, which helps with the peristaltic movements of the digestive tract. Sesame oil has an antibacterial and astringent effect, so if applied to the mouth, it helps maintain oral health.

## 5. Discussion

The National Primary Care Policy [91] establishes:

*[...] Considering the diversity and complexity of the situations that Primary Care deals with, comprehensive care requires the presence of different professional backgrounds working with shared actions, as well as with an interdisciplinary process centered on the user [...]*

Currently, the global trend in healthcare is to work in multidisciplinary teams because the focus of care is the patient. Therefore, each professional can collaborate with expertise in his/her area of activity and there are interfaces in which everyone can contribute. For example, the nutritionist advises on the diet for the patient's clinical conditions and the pharmacist analyzes whether that diet can positively interfere with pharmacotherapy, which is of great importance to achieve the proposed therapeutic goal. It is important to highlight the importance of a healthy and diversified diet for different clinical conditions among patients.

The pharmacist works in pharmaceutical care, which is:

*[...] a model of practice that guides the provision of different pharmaceutical services directly aimed at the patient, the family and the community. These aiming at the prevention and resolution of problems from pharmacotherapy to the optimal use of medicines, the promotion of protection and recovery of health, as well as the prevention of diseases and other health problems. The essential responsibility of the pharmacist is to ensure that all of the patient's medication therapy is appropriately indicated to treat the patient's health problems, that the medications used are the most effective and safe, and that the patient is willing and able to use them appropriately [...]* [92]

Pharmaceutical care in different patient's scenarios, educational practice aims to develop autonomy and responsibility for daily decisions that involve their health care, *i.e.*, the patient's empowerment.

Guidance on the benefits of the diet that positively affects the patient's quality of life is necessary, and the use of technical guides facilitates this guidance, in general, for all health professionals who manage the patient. Particularly, with regard to chronic non-communicable diseases, it is necessary for the patient to be aware of some food resources that can help to balance their health and that will not interfere with the medications they use. Therefore, many seeds are used to control diabetes, dyslipidemia, kidney disease, high blood pressure, stimulate control of

bowel movements, obesity, have antioxidant properties against free radicals, source of proteins, lipids, minerals, can act to inhibit cancer cells. They can also have antimicrobial properties; contribute to cardiovascular protection, supply of dietary fiber, anti-inflammatory, neuroprotective action, reduction of blood glucose levels, among countless other properties that can be attributed to them.

Despite the countless beneficial contributions that seeds provide, it is important to emphasize that they can also bring harm if not used properly, so the need for guidance from a health professional is essential.

## 6. Conclusion

Through the technical sheets presented, it is possible to specifically target the seeds that would be most suitable for supplementing the diet and thus assist in pharmacotherapy and, particularly, the patient's understanding that he/she is a participant in the process of recovering/maintaining his/her health. From the perspective of clinical care, it is necessary to know all the habits and diet of patients so that they can be tools to improve the quality of health and that they can be used safely, depending on individual needs, in the indicated doses. Technical sheets constitute an important tool for guidance in patient management by health professionals.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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