


# Roots, Rhizomes or Tubers: How They Can Be Used to Improve the Quality of Life in Individuals Who Are Already Taking Medications

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## Abstract

The article contains a list of 14 structured technical sheets on roots, rhizomes or tubers 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 (when described in the consulted literature), 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 shows that there is a need for a careful evaluation of the foods (that contain roots, rhizomes, or tubers) used by polymedicated people due to possible interactions and incompatibilities that may exist.

## Keywords

Roots, Rhizomes, Tubers, Medicines, Food, Healthcare, Quality of Life

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## 1. Introduction

The roots [1] (plant organ that has two main functions: serving as a means of attachment to the soil and as an organ to absorb water, nitrogenous compounds and other mineral substances such as potassium and phosphorus) make part of our food intake, the rhizomes [2], A species of stem generally underground, almost always horizontal and the tubers [3] (the rounded stem that some green plants develop below the surface of the soil as energy reserve organs) are part of the world's diet.

It is important to know that in many situations medications that are administered after full meals may have favorable interactions (diazepam, griseofulvin, hydrochlorothiazide, nitrofurantoin, propranolol, etc.). In addition, on another aspect, in relation to the ingestion of citrus fruit juice with medications, it may lead to a change in pH, which may impair the dissolution of drugs as well as act on the active transport of drugs in the digestive tract. Other examples of drug and food interactions include: tetracyclines with foods rich in minerals, calcium, iron, copper, manganese, zinc as they can form insoluble chelates, and therefore not absorbed, in addition to monoamine oxidase (MAO) inhibitors and tyramine, which is found in numerous fermented products because it promotes the release of norepinephrine from the endings of adrenergic fibers, which leads to arteriolar constrictions and hypertension [4].

In relation to foods, the World Health Organization (WHO) [5] established in its report that there are changes in eating patterns, a decline in energy expenditure associated with a 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. By establishing ways to lessen the burden of chronic diseases such as obesity, type 2 diabetes, cardiovascular disease (including hypertension and stroke), cancer, dental disease and osteoporosis, this report proposes that nutrition be placed at the forefront of public health policies and programs.

However, some foods made available for consumption may help or harm the absorption of medicines. In the context of health education, it is up to the population and health professionals to guide in relation to foods, in particular, roots, rhizomes and tubers that may interact with medicines. Foods were selected to prepare technical sheets that can be consulted as part of health education.

## 2. Objective

The main goal was to develop technical sheets for fourteen roots, rhizomes or tubers that may assist in the health of medicated individuals.

## 3. Method

This was a study carried out through a bibliographical survey. The technical sheets for fourteen roots, rhizomes or tubers were structured to provide information on the composition of them, active ingredients, possible interactions with medicines, and the conditions under which they can contribute to improving the patient's quality of life.

The choice of the 14 species was based on availability, medicinal value that adds nutritional characteristics to people and because they are very common in the diet in several countries. The bibliographical survey of the studied species was not easy due to the structural items described in the technical sheets. Typically, these items were also found on official websites of companies that provide this type of food. Gathering academic technical information was a major challenge due to the

difficulties encountered.

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

### 4.1. *Arracacia xanthorrhiza* (Apiaceae)

It is a food rich in carbohydrates, making it a great option for weight loss diets due to the satiety it promotes. *Cassava* is very versatile in the kitchen and makes a variety of recipes.

Composition in 100 g: 87 kcal, 76.7 g moisture, 21.6 g carbohydrates, 0.82 g protein, 0.12 g lipids, 1.93 g dietary fiber, 0.83 g ash, 15.2 mg calcium, 0.27 mg iron, 10.6 mg of magnesium, 40.1 mg of phosphorus, 448 mg of potassium, 0.06 mg manganese, 0.18 mg zinc, 0.04 mg copper, 0.2 µg selenium, 0.12 mg vitamin A (retinol), 0.08 mg vitamin E (alpha-tocopherol), 0.04 mg vitamin B1 (thiamine), 0.11 mg of vitamin B6 (pyridoxine), 6.7 mg of vitamin C (acid ascorbic acid) and 0.12 mg of vitamin B9 (folate) [6].

Active ingredients: B vitamins, vitamin C, vitamin A, zinc, magnesium, copper, iron, calcium, phosphorus and potassium [7].

Conditions it helps: Prevents premature aging: as it is rich in antioxidants, such as vitamin C. Reduces the risk of cancer: the action of antioxidants against cell degradation is also essential to prevent the emergence of diseases such as cancer. Improves digestion: cassava is a good source of insoluble fiber. Improves bone health: foods rich in calcium and iron reduce the risk of problems such as osteoporosis. Strengthens the heart: regular consumption of cassava helps reduce bad cholesterol and maintains triglyceride balance. Vitamin D, present in the tuber, is also considered an important ally in preventing heart problems. Helps improve eye health: vitamin C helps prevent vision problems resulting from degeneration of the macula, part of the retina responsible for perceiving details. According to research published in *The American Journal of Clinical Nutrition*, consumption of the nutrient reduces the risk of developing cataracts [8].

Contraindications: *Cassava* contraindications exist for people who have some food intolerance. In these cases, consumption may result in gastric discomfort and poor digestion. Furthermore, people with diabetes should consume the food in moderation, as it can cause changes in blood glucose levels [8].

### 4.2. *Beta vulgaris* (Amaranthaceae)

Beetroot is a root that stands out for being rich in sugar and iron. It works to combat anemia, spleen and liver problems, constipation, among others.

Composition in 100 g: 43 kcal, 87.58 g of water, 1.61 g of protein, 0.17 g of total fat, 9.56 g of carbohydrates, 2.8 g of dietary fiber, 6.76 g of monosaccharides, 16 mg of calcium, 0.8 mg of iron, 23 mg of magnesium, 40 mg phosphorus, 325 mg potassium, 78 mg sodium, 0.35 mg zinc, 4.9 mg vitamin C (ascorbic acid), 0.031mg vitamin B1 (thiamine), 0.04 mg vitamin B2 (riboflavin), 0.334 mg vitamin B3

(niacin), 0.067 mg vitamin B6 (pyridoxine), 109 µg of folic acid, 2 µg of vitamin A (retinol), 0.04 mg of vitamin E (α-tocopherol) and 0.2 µg of vitamin K (phylloquinone) [9].

Active ingredients: Glutamine; Volatile Substances: pyridine; Rafanol; Saponins; Alkaloid: betalain; Flavonoids: isoramnnetin [10].

Drug interaction: Beetroot can interact with some medications, which may worsen the disease state, including medications that lower cholesterol and some that are consumed orally, as the saccharin in beetroot (fiber) can decrease the speed of elimination of these drugs in the body [11].

Conditions that help: Can act to reduce cholesterol: This is because fibers have an effect on metabolism, interfering with the lower absorption of fats by the body. Helps strengthen the immune system: rich in vitamin C, an important nutrient for maintaining and strengthening the immune system. It works to reduce high blood pressure: due to the presence of nitrate. Prevents constipation: as it is rich in fiber, beetroot also helps regulate bowel function. Maintains stable blood glucose levels: due to the fiber present, helping to control diabetes or prevent the development of this chronic disease [12].

Contraindications: It should be consumed with caution by patients suffering from diarrheal-type intestinal disorders or patients with a tendency to form stones due to its high content of oxalic acid. Cautious consumption is advised in patients with diabetes mellitus or pre-diabetics, individuals with hypoglycemia, polymedicated patients and patients with renal failure [10] [11].

### **4.3. *Brassica Rapa* L. (Brassicaceae)**

Turnip has numerous health benefits, as it is rich in vitamins, minerals, fiber and water, and can be used to cook several different dishes or even to prepare home remedies, as it also has great medicinal properties.

Composition in 100 g: 18 kcal, 94 g of moisture, 4.46 g of total carbohydrate, 0.91 g of protein, 0.06 g of lipids, 1.88 g of dietary fiber, 0.52 g of ash, 41 mg of calcium, 0.22 mg of iron, 2.38 mg of sodium, 14.1 mg magnesium, 16 mg phosphorus, 270 mg of potassium, 4.27 mg of manganese, 0.18 mg of zinc, 0.04 mg of copper, 0.51 µg of selenium, 0.02 mg of vitamin E (α-tocopherol), 0.03 mg of vitamin B6 (pyridoxine), 9.23 mg of vitamin C (ascorbic acid), 11 µg of vitamin B9 (folate) and 0.1 µg of vitamin K (phylloquinone) [13].

Active ingredients: Glucosinolates, isothiocyanate, phenolic compounds, flavonoids and organic acids [14] [15].

Drug interaction: Oral anticoagulants, especially warfarin, act by inhibiting vitamin K, which is the main vitamin that participates in the blood clotting process. Therefore, diets rich in this vitamin make warfarin less effective, and the consumption of supplements or foods rich in vitamin K, such as turnips, should be avoided [16].

Conditions it helps: Slows down premature aging, improves the appearance of the skin and strengthens the immune system: source of antioxidants. Anti-

inflammatory effects: source of vitamin K, which regulates the body's inflammatory response system, thus preventing various types of diseases such as arthritis. Hepatoprotective effect: presence of flavonoids and anthocyanins, which reduce the activities of liver enzymes. Promotes bone health: source of calcium and potassium. Reduces blood pressure: due to the vasodilating action of the potassium present in turnip. Relieves constipation: regulates the intestine, as it is a source of fiber. Reduces the risk of cancer: presence of isothiocyanate that inhibits the growth of hepatoma cells. Antimicrobial activity: prevents bacterial infection due to the presence of glucosinates, carbon tetrachloride and phenolic compounds [14] [15].

#### 4.4. *Colocasia esculenta* (Araceae)

A tuber that is always very popular in gastronomy due to its versatility. This nutritious food has stood out not only for its flavor, but also for the numerous health benefits it offers.

Composition in 100 g of raw root: 89 kcal, 76.1 g of moisture, 20.5g of carbohydrate, 1.42 g of protein, 0.14g of lipids, 1.6 g of dietary fiber, 0.98g of ash, 14.9 mg of calcium, 0.02 mg iron, 17.1mg of magnesium, 59.1 mg of phosphorus, 231 mg of potassium, 0.12 mg of manganese, 0.36 mg of zinc, 0.15 mg of copper, 0.82 µg of selenium, 4.77 µg of vitamin A (retinol), 1.68 mg of vitamin E (alpha-tocopherol), 0.05 mg of vitamin B1 (thiamine), 0.07 mg vitamin B6 (pyridoxine), 2.02 mg of vitamin C (ascorbic acid) and 8.97 µg of vitamin B9 (folate) [17].

Active ingredients: Flavonoids and diosgenin. vitamin C, vitamin B6, potassium, magnesium and folate (B9) [18] [19].

Conditions it helps: To combat constipation and control blood sugar levels, as it is rich in fiber. It provides energy and contributes to the gain of muscle mass, as, like other tubers, the food contains carbohydrates that maintain an energy supply for training. Relieves the symptoms of menopause and PMS, thanks to diosgenin, a substance that helps control female hormones. It works to prevent cardiovascular diseases, as it helps control blood pressure and lowers cholesterol. It helps with good digestion, reduces colic and also eliminates toxins from the body. Ally in weight loss, as it increases the feeling of satiety [20].

Contraindications: Should be avoided by people with intolerance or allergies. People with kidney disease also need to avoid the tuber, as it contains oxalates, substances that can contribute to the formation of kidney stones [18].

#### 4.5. *Curcuma longa* L. (Zingiberaceae)

Turmeric (*Curcuma longa* L.), a species native to Southeast Asia, is considered a precious spice. Also known as turmeric or turmeric, turmeric is an herbaceous plant from the ginger family. It has antioxidant, antimicrobial and coloring substances that enable its use in the cosmetics, textile, medicinal and food sectors [21].

Composition in 100 g: 312 kcal, 12.8 g of water, 67.1 g of carbohydrates, 22.7 g

of fiber, 9.68 g of proteins, 3.25 g of total fat, 208 mg of magnesium, 168 mg of calcium, 27 mg of sodium [22]. Chemical composition: Curcuminoids or dyes (2-9%): curcumin or diferuloylmethane (60%), curcumin I, II, III; dihydrocurcumin, cyclocurcumin. Oxidation curcumins convert into vanillin [23].

Active ingredients: The main active compound in turmeric is a curcuminoid, called curcumin (polyphenol)—characterized by its yellow color [21] [24].

Drug interaction: The presence of substances with anticoagulant activity may interfere with patients who are receiving anticoagulant treatment [23].

Conditions it helps: Reduces inflammation—improves arthritis, osteoarthritis, muscle pain and joint pain; Antioxidant properties—helps neutralize free radicals and has a protective effect against neurodegenerative diseases such as Alzheimer’s and Parkinson’s; Heart health benefits—reduces the risk of heart disease; Improves immunity; Diabetes control [25] [26].

Contraindications: Turmeric has an emmenagogue effect and is not recommended during pregnancy. It is contraindicated for children under 4 years of age, people with bile duct obstruction and gastric ulcers [23].

#### 4.6. *Daucus carota* L. (Apiaceae)

Originally from Central Asia, the carrot is a tuberous, fleshy, smooth and orange root, cultivated and frequently consumed in Brazil [27].

Composition in 100 g of raw root: 41 kcal, 88.3 g of water, 9.58 g of carbohydrates, 4.74 g of total sugars (3.59 g of sucrose, 0.59 g of glucose, 0.55 g of fructose), 2.8 g of dietary fiber, 0.93 g protein, 0.24 g total fat, 320 mg potassium, 69 mg of sodium, 35 mg of phosphorus, 33 mg of calcium, 12 mg of magnesium, 5.9 mg of vitamin C, 0.66 mg of vitamin E, 0.3 mg of iron, 0.24 mg of zinc and 0.143 mg of magnesium [28].

Active Ingredients: Carotenoids, flavonoids and vitamin C [28] [29] Carotenoids Substances converted to vitamin A essential for the functioning of the body, such as for the origin and development of organs, maintenance of eye health and proper functioning of the immune system [30] [31]. Flavonoids Substances that have antioxidant activity and contribute to the maintenance of glucose and cholesterol levels, as well as to the functioning of the immune system [30]. Vitamin C Substance with antioxidant characteristics. It is essential for iron absorption, collagen synthesis, and maintenance of the immune system [30].

Conditions it helps: Chemoprevention: beta-carotene has cancer chemopreventive activity when ingested in physiological amounts (about 4 to 6 mg/day) [32]. Protection against oxidation. The consumption of carotenoids, especially vitamin A, has been related to the protection of DNA, proteins and lipids against oxidation and the maintenance of normal functions of the immune system, skin, mucous membranes and vision [31]. Maintaining skin health Carotenes (especially beta-carotene) have photoprotective properties, in addition to increasing skin elasticity. Beta-carotene also promotes the production of melanin, favoring a “tanned” appearance of the skin [33] [34].

Drug interaction: It should not be consumed with medications: paracetamol and digoxin (decreases drug absorption) and furosemide (sodium depletion) [35].

#### **4.7. *Dioscorea bulbifera* (Dioscoreaceae)**

Gizzard yam is a plant of Asian and African origin, naturalized in Brazil, and is one of the rare tubers that do not grow underground. They can be boiled, roasted or fried. The tubers have medicinal properties, and after drying, they can be transformed into flour for baking or used as a source of starch for the pharmaceutical and cosmetics industry [36].

Composition: 75.50% moisture, 0.90% ash, 0.50% lipids, 6.90% fiber, 1.80% proteins and 15.90% carbohydrates. 105.12 kcal/100 g. Vitamins B5 (niacin) and B1 (thiamine), soluble fibers, calcium, iron and potassium [37].

Active ingredients: Phytohormone (diosgenin), alkaloids (dioscorine) and saponin [38].

Conditions it helps: The juice of the roots serves to expel intestinal worms. It can be dripped onto wounds to eliminate germs. They are used externally as a poultice to treat wounds, boils and inflammations. In dressings for treating dermal parasite and fungal infections, or crushed, mixed with palm oil and massaged into areas of rheumatism, for breast and chigger problems. In India, the tuber is considered a diuretic and a remedy for diarrhea and hemorrhoids [38]. Stimulates appetite and aids in the digestive process, ensuring a healthy digestive system. Contributes to intestinal health and helps control blood sugar levels. Strengthens bones, prevents anemia and promotes cardiovascular health [39].

Drug interaction: Concomitant use of acetylsalicylic acid increases thiamine excretion. The concomitant use of atorvastatin, digoxin or ciprofloxacin implies a reduction in the absorption of the drugs, due to the presence of fiber and calcium. The pharmacological effects of methyl dopa may decrease during concomitant administration, due to the presence of iron. The use of enalapril or losartan concomitantly with foods rich in potassium increases the risk of hyperkalemia [40].

#### **4.8. *Glycyrrhiza glabra* L. (Fabaceae)**

Licorice belongs to the Fabaceae family and can be known as glycyrrhiza, regaliz or sweet root. It is one of the oldest medicinal plants in the world and consists of horizontally growing roots and stems [41].

Composition in 100 g: Triterpene saponins, flavonoids, coumarins, chalcones, hormonal substance, similar to deoxycorticosterone, glucose, sucrose, amyl, gums, mannitol, resins, tannins and essence (traces) [41].

Active ingredients: Saponins, flavonoids, coumarins, phytosterols and essential oils [42]. The marker is glycyrrhizic acid. Daily Dose 200 to 600 mg of glycyrrhizic acid [43].

Indications: Increases the secretion of compounds that alleviate gastric problems, effective against *H. pylori*, has antimutagenic, anti-inflammatory and antioxidant

properties, reduces cortisol and aldosterone levels, improves memory. Furthermore, studies indicate that it can act as an antidepressant, help reduce symptoms of diabetes and alleviate symptoms of menopause [43]. It should not be used continuously for more than six weeks.

**Drug interaction:** Use is not recommended for patients using spironolactone, amiloride, corticosteroids, diuretics, cardiotoxic glycosides, stimulant laxatives due to the risk of electrolyte imbalance. May enhance the effect of MAO inhibitors and increases the bioavailability of nitrofurantoin. Should not be used during estrogen replacement therapy. Prolonged use may increase the effects of mineralocorticoids, due to increased sodium and water retention and increased potassium excretion [41] [44].

**Contraindications:** It should not be used in:

children, pregnant and breastfeeding women; patients with arterial hypertension, kidney, liver and cardiovascular disorders, in addition to in cases of hyperkalemia and hypertonia as these people are more susceptible to adverse effects, for people recovering from alcoholism due to the possibility of being more sensitive to adverse effects, especially myopathy due to loss of potassium, in overweight people due to the risk of high blood pressure, diabetes and cardiovascular disorders, in diabetics, with profuse secretion or congestion of mucous membranes and, also, in hormone-dependent neoplasms and glaucoma. It reduces intestinal contractions, type II diabetics, hyperestrogenism and hormone-dependent neoplasms and can enhance the effect of MAO inhibitors [41] [44].

#### **4.9. *Manihot esculenta* (Euphorbiaceae)**

Chosen by the United Nations (UN) as the most important food of the century, cassava is a tuber cultivated in more than 100 tropical and subtropical countries and serves as a staple food for more than 800 million people worldwide [45].

**Composition in 100 g:** 125.4 kcal, 1.6 g of dietary fiber, 0.6 g of proteins, 0.1 g of protein, 0.1 g of saturated fats, 100.4 mg of potassium, 26.8 mg of magnesium, 22.4 mg of phosphorus, 18.6 mg of calcium and 0.9 mg sodium [46].

**Active ingredients:** Rich in carbohydrates (mainly in the form of starch), dietary fiber, B vitamins (especially folic acid and thiamine), minerals (K, Mg), flavonoids, tannins [47].

**Drug interaction:** The concomitant use of atorvastatin or ciprofloxacin implies a reduction in the absorption of the drugs, due to the presence of fiber and magnesium. Concomitant use of acetylsalicylic acid increases the excretion of folic acid and thiamine. The use of enalapril or losartan concomitantly with foods rich in potassium increases the risk of hyperkalemia. The presence of tannins may interfere with the absorption of iron from medicines or foods [48].

**Conditions it helps:** Diabetes control—cassava reduces the speed of glucose absorption; Improves intestinal health—due to dietary fiber; It's good for the vision—it has vitamin A and B1; Maintenance of bones and teeth—contains phosphorus and calcium; Strengthens immunity—has vitamin C, which is important

for the immune system, collagen formation and wound healing; Source of antioxidants—helps contain free radicals; Fights arthritis—has anti-inflammatory action; Fights bad cholesterol—prevents the elevation of LDL cholesterol in the blood [49].

Contraindications: In general, cassava is a very healthy food, without many contraindications. The best advice from experts is not to consume it raw, as in this state it has a large amount of hydrocyanic acid (the minimum amount was not found in the researched literature), which can cause serious poisoning. When cooked, it loses this property and becomes a recommended food for all ages [50].

#### **4.10. *Raphanus sativus* (Brassicaceae)**

Radish is a tuberous root with red and/or white skin and white pulp with a sweet, refreshing or spicy flavor.

Composition in 100 g of raw root: 16 kcal, 95.3 g of water, 0.68 g of protein, 0.1 g of total fat, 3.4 g of carbohydrates, 1.86 g of total sugars, 1.6 g of fiber, 233 mg of potassium, 39 mg of sodium and 25 mg of calcium [51].

Active ingredients: With its pinkish red color, radish is rich in Vitamin C and also contains sulfur, potassium, calcium, phosphorus, iron, sodium, chlorine and magnesium [52].

Conditions it helps: Blood pressure control Radish helps reduce and control blood pressure due to high levels of potassium. Prevents infections in the urinary system Diuretic effect and detoxifying action, purifying the blood and eliminating toxins from our body. Prevents cardiovascular diseases Source of anthocyanins, which have antioxidant action. Weight loss and appetite control Radish has a low caloric value, contains fiber and several nutrients that make you feel full [53].

Contraindications: People with hypothyroidism should consume radish no more than twice a week, because this root contains glucosinolates, compounds that reduce the production of thyroid hormones [54].

Drug interaction: It is not recommended for those taking medication for blood pressure problems [55].

#### **4.11. *Rheum rhabarbarum* (Polygonaceae)**

Rhubarb is a root often used to treat constipation. With an acidic and slightly sweet flavor, its stem can be consumed raw, cooked, in the form of teas or incorporated into recipes.

Composition in 100 g: 21 kcal, 4.54 g of carbohydrates, 1.8 g of fiber, 1.1 g of total sugars, 0.9 g of protein, 288 mg of potassium, 86 mg of calcium, 12 mg of magnesium, 4 mg of sodium, 8 mg of vitamin C and 5 µg vitamin A [56].

Active ingredients: Gallic and catechuic tannins, organic acids, flavonoids, oxalic acid [57].

Drug interaction: Its consumption may interfere with the absorption of iron

and other minerals [57] [58].

Conditions it helps: Reduce cholesterol and triglycerides, rhubarb has an effect on body fats, helping to reduce “bad” cholesterol, LDL. Control blood pressure, as it contains antioxidants with anti-inflammatory effects and is rich in potassium, a mineral that helps relax blood vessels. Prevent neurodegenerative diseases, as it is rich in antioxidant nutrients, such as selenium and choline. Relieve constipation, by containing substances such as anthraquinones. Prevent osteoporosis, as it is rich in vitamin K, a vitamin necessary for the production of osteocalcin, a protein whose function is to fix calcium in bones, being essential for the normal development of bones. Improve digestion by increasing the flow of bile in the intestinal tract. Prevent aging, as it is a natural antioxidant that neutralizes free radicals [59].

Contraindications: Rhubarb should not be consumed by people with a history of allergic reactions when consuming this plant, babies, children, pregnant or breastfeeding women and people with kidney or liver problems. Do not use in cases of hemorrhoids [57] [59].

#### **4.12. *Solanum tuberosum* (Solanaceae)**

The potato is a tuber native to South America. It is an energetic food, rich in proteins and an important source of mineral salts [60].

Composition in 100 g: 78.50 kcal, 62.3 g of water, 13.8 g of carbohydrates, 1.4 g of proteins, 0.8635 g of salts, 0.0785 g of fats, 45 IU of vitamin A, 165 mg of vitamin B1 (thiamine), 320 mg vitamin B2 (riboflavin), 1mg vitamin B5 (niacin) and 15 mg vitamin C (ascorbic acid) [61].

Active ingredients: Potatoes are a good source of vitamin C and some B vitamins such as B1, B2 and B5 [61].

Drug interaction: Potatoes can increase the therapeutic effect of succinylcholine. The mechanism of this interaction is likely inhibition of plasma cholinesterase by solanaceous glycoalkaloids, compounds contained in potatoes. Concomitant use of acetylsalicylic acid increases the excretion of thiamine and vitamin C [62] [63].

Conditions it helps: Anti-inflammatory action—the presence of organic salts present in potatoes can reduce inflammation in diseases such as arthritis. Wound healing—the use of raw potatoes has an anti-irritant and decongestant effect; in digestive health—it has a significant amount of fiber that helps intestinal motility; helps combat anemia—potatoes have significant levels of iron and folic acid; has anti-cancer potential—due to the presence of anthocyanins, potatoes can prevent the growth of cancer cells [64].

Contraindications: Diabetic patients, carbohydrates should not be part of the diet or, at least, should be consumed in a restricted manner. People with high blood pressure, a study published in 2016 showed that eating potatoes four or more times a week can contribute to increasing blood pressure levels. Overweight people, as it contains a high level of carbohydrates [62] [65].

#### 4.13. *Taraxacum officinale* F. H. Wigg. (Asteraceae)

The first records of the medicinal use of dandelion date back to the 11th century in Arabic medical writings. In the 16th century it was already widely used in Europe to treat liver problems and heal wounds [66].

Composition in 100 g: 45 kcal, 85.6% water, 2.7 g protein, 0.7 g fat, 9.2 g carbohydrates, 1.6 g fiber, 187 mg calcium, 66 mg phosphorus, 3.1 mg iron, 76 mg sodium, 297 mg potassium, 35 mg vitamin C (ascorbic acid), 0.26 mg of vitamin B2 (riboflavin), 0.19 mg of vitamin B1 (thiamine), 8,400 µg of beta-carotene [67].

Active ingredients: Inulin, sitosterol, stigmasterol, flavonoids, taraxac, caffeic acid, citric acid, phenylacetic acid, and potassium [66] [67].

Drug interaction: May potentiate the effects of antidiabetic agents (causing hypoglycemia) and loss of fluid and electrolytes. Possible additive hypotensive effect. It can decrease the absorption of some antibiotics such as (ciprofloxacin, enoxacin, norfloxacin, etc.) and increase the toxicity of lithium. May increase responses to muscle relaxants [66] [67].

Conditions it helps: Improves digestion, helping to relieve symptoms such as gas and gastric fullness. Appetite stimulation. Diuretic, in cases of swelling caused by fluid retention, and in cases of decreased urine production. Prevents heart disease, has hypocholesterolemic and antioxidant properties. Prevents and helps in the treatment of bacterial infections, as it is rich in antioxidant and antibacterial compounds [68] [69].

Contraindications: Avoid the use of the plant by pregnant or lactating women, as the effects are not known. Contraindicated in cases of gallstones, gallbladder inflammation, obstruction of the bile or gastrointestinal ducts, gastritis, gastric and duodenal ulcers, kidney failure, liver disease, irritable bowel, diabetes and heart disease [66]-[69].

#### 4.14. *Zingiber officinale* Roscoe (Zingiberaceae)

*Zingiber officinale* Roscoe, popularly known as ginger, is a rhizome of Asian origin and has anti-inflammatory, antiemetic and antidiarrheal activities [70].

Composition in 100 g: 80 kcal; 78.89 g water; 17.7 g carbohydrates (by difference); 2 g dietary fiber; 1.82 g proteins; 1.7 g monosaccharides; 0.75 g total fat. Rich in potassium, niacin and vitamin B6 [71].

Active ingredients: Gingerol, shogaol, zingerone and niacin [70] [72] [73].

Drug interaction: People taking ginger and medicines that prevent clots may need to be monitored for bleeding or clots [71].

Conditions it helps: relief of nausea and vomiting—Ginger stimulates the digestion and absorption of fats due to greater secretion of bile salts and the activity of pancreatic lipase; antioxidant properties—helps eliminate free radicals; anti-inflammatory action—due to its more than 400 natural compounds prevention of gastric diseases—indigestion, gastritis, ulcers, nausea and vomiting, relief of menstrual cramps; reduced bloating and gas—Ginger can reduce fermentation and constipation [74] [75].

Contraindications: The use of ginger can cause interactions with several classes of medications (anticoagulant, antidiabetic and antihypertension). Due to the cardiogenic, antiplatelet (*in vitro*) and hypoglycemic (*in vivo*) activity of ginger, it is recommended not to administer high doses because it may interfere with the basic medication in patients with heart failure, coagulopathies and diabetes. In animal tests, ginger extracts increased the absorption of sulfaguanidine by around 150% compared to control groups [76].

## 5. Discussion

The contemporary pharmacist works in direct patient care, and promotes the rational use of medicines and other health technologies, redefining his practice based on the needs of patients, family, caregivers and society, with patient centered care in a biopsychosocial model, prioritizing humanization in health. The humanized relationship involves respect for the beliefs, expectations, experiences, attitudes and concerns of the patient or caregivers regarding their health conditions and the use of medications, in which the pharmacist and patient share decision-making and responsibility for health outcomes achieved [77] [78].

Many diseases may be linked to the quality of one's diet, and understanding food can help improve quality of life, as well as prevent the compromise of medication effectiveness due to potential interactions with certain drugs. Another important aspect is that roots, rhizomes or tubers in particular, can contribute to restoring health in the face of certain conditions people may experience.

To this end, the prescriber and the professional responsible for dispensing medications must advise how food can be used to maintain and/or recover health. This assessment must be based on the patient's clinical assessment so that individualized guidance can be provided in relation to needs and, therefore, quantitative data are not available except in food composition tables when processed food, in relation to the recommended daily intake. In the routine use of purchasing in commercial centers, this information is not available, and personal taste foods are selective at the time of acquisition.

## 6. Conclusion

Health education is a valuable tool for pharmaceutical care. Furthermore, it is of inestimable value for guiding the rational use of medicines, of which a large part of the population does not have knowledge. Therefore, guides help the pharmacist's intervention with the patient in pharmaceutical care. They are necessary and should be part of this professional's routine. Patients must be helped with their needs, that is, the pharmacist must have a clinical perspective to understand the patient as a whole in a biopsychosocial model. However, any health professional and the public can use the technical sheets presented.

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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