

FRUIT AND VEGETABLE-BASED BEVERAGES—NUTRITIONAL PROPERTIES AND HEALTH BENEFITS

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11.1 Introduction

Fruit and vegetable-based beverages are part of a balanced diet that ensures the health and the vigor of the body. They participate actively in cellular regeneration, detoxification, and treatment of many diseases, being recommended by nutritionists for a healthy lifestyle. The usage of fruit and vegetable beverages for the detoxification, regeneration, and healing of the body is recommended for two good reasons: the first is that the essential part (both for vegetables and fruits) is in their sap, which is obtained in the form of juice and the second is that the juice of raw vegetables and fruits is assimilated in the body in about 10–15 min and is used almost entirely for feeding and regenerating tissues with a minimal effort of the digestive system.

However, there are beverages that are beneficial for health through the ingredients they contain and harmful beverages that are nothing but liquids that provide excess sugars and almost no essential nutrients. This is why scientific evidence on the chemical composition and the possible health benefits of various fruits and vegetables are needed whenever a nutritional plan is required.

Natural fruit and vegetable beverages are tasty, nourishing, and rich in vitamins, minerals, and phytonutrients, more precisely natural bioactive compounds that interact positively with food fibers and other substances taken from food. Nutritionists from the University of California (Los Angeles) have also created a top of the healthiest beverages, the top five being occupied by pomegranates, cranberries, acai, noni, and cherries.

A very good way to introduce important nutrients into the diet is through vegetable juices. They are deeply detoxifying and regenerating and improve metabolism. They contain all the necessary amino acids, minerals, salts, enzymes, and vitamins, provided they are fresh, raw, preservative-free, and properly extracted from vegetables (the best option is the centrifuge juicer designed specifically for extracting these juices). Fibers in all vegetable juices quickly induce the feeling of satiety and improve digestion. The reason vegetables are the healthiest is that they have the lowest amount of sugar in their composition and provide fewer calories than fruit juices. The only inconvenience is the higher sodium content.

11.2 The Health Benefits of Consuming Fruits and Vegetables Juices

As early as 2003, the WHO published a research report whose conclusions recommended a daily portion of 400 g of either fruit and vegetables (excluding potatoes and starchy tubers) for the prevention of occurrence of possible chronic diseases, and for the prevention of micronutrient deficiencies (WHO, 2003). More recently, the general recommendations are to consume five portions of fruits and vegetables a day. Moreover, the fruits represent one of the components of the national programs of healthy nutrition that are implemented in the schools in most of the European countries, together with the dairy products.

The result of a study which assess the average fresh and frozen fruit and vegetables and frozen consumption and the effect on nutrient intakes across gender and age categories, based on combined data from the National Health and Nutrition Examination Survey 2011–2014 and the Food Pattern Equivalents Database 2011–2012 is presented in Fig. 11.1 (Storey and Anderson, 2017).

Although fruit and vegetable consumption is highly recommended for a healthy and balanced diet, several European countries do not meet these recommendations. For example, in Italy, only 45% of young people are consuming at least one portion of vegetables per day (Menozzi et al., 2015).

According to the Eurostat data, in 2014, 60% of the EU population consumed at least one portion of fruit and vegetables daily. Only 14.1% of the interviewed individuals consumed more than five portions a day. In the United Kingdom, one-third (33.1%) of the population consumed more than five daily portions; in Denmark, it was 25.9%; and in the Netherlands 25%. The opposite was found in Romania, where almost two-thirds (65.1%) of the population did not consume any fruit or vegetables daily (De Cicco, 2017). Data made

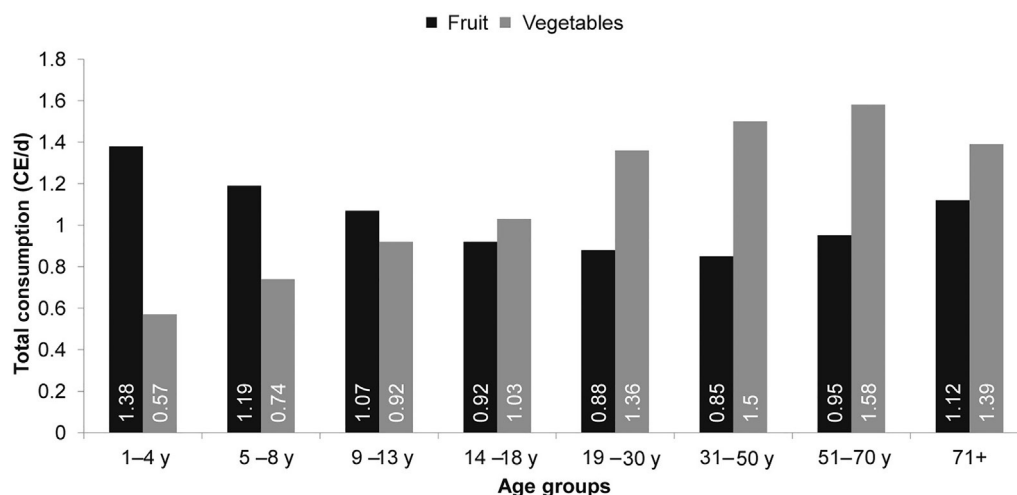


Fig. 11.1 Total fruit and vegetable consumption across age groups (¹cup equivalents/day).

public by the European Food Information Council (EUFIC) show that consumption of fruit across Europe ranged from 577 g/day in Poland to 196 g/day in Iceland, and vegetable consumption varied from a minimum of 109 g/day in Norway to a maximum of 284 g/day in Cyprus (Menozzi et al., 2015).

People who want to strengthen their immune system and reduce blood pressure and cholesterol levels can regularly drink beverages made from beets, carrots, celery, currants, spinach, grapes, cherries, or watermelons, with garlic and ginger supplementation. Studies have shown that beverages can affect the cardiovascular risk factors by lowering blood pressure through antioxidant effects and improvement of the cardiovascular system (Binia et al., 2015; Zheng et al., 2017). In order to treat deficiency in potassium, magnesium, or calcium, beverages based on melon, apricots, peaches, or broccoli are beneficial. Heart disease can be prevented with pineapple and ginger, pear, and parsley beverages. On the other hand, carbonated drinks, fruit cocktails, and energy drinks are among the most harmful beverages.

Some authors consider that the consumption of fruit and vegetables represents a prerequisite of higher-quality diets. It was reported that a diet rich in fruit is associated with a lower risk of cardiovascular disease (CVD) events and mortality (Wang et al., 2014). However, less information is provided on the benefits of the consumption of fruit and vegetable juices to diet quality. Based on these considerations, Francou et al. released a survey (almost 2000 individuals) on the consumption patterns of fruit and vegetable juice among population in France. The mean total consumption of fruits and vegetables was 2.6 servings/day for children and 3.8 servings/day for adults. In the same

time, the values for fruits and vegetables 100% beverages were 83 mL/day for children and 54.6 mL/day for adults, which are far less than the recommended values (Francou et al., 2015).

Therefore, fruit and vegetable-based beverages may provide important beneficial effects on human health. They contain a wide range of biological active compounds, such as polyphenols, oligosaccharides, fiber, and nitrate, which may induce an antioxidant, antimicrobial, and antiviral effects. Although the juice-based diets are becoming more and more popular, some authors consider there is a lack of scientific evidence of their health benefits (Henning et al., 2017).

Nevertheless, there are various studies investigating the chemical composition of fresh or cooked vegetables and fruits, and some of them will be overviewed throughout these book chapters. For example, it was demonstrated that vegetables like broccoli and cauliflower provide flavonoid, phenolic compounds, carotenoids, quercetin, and ascorbic acids, with high antioxidant activity (dos Reis et al., 2015; Koh et al., 2009).

On the other hand, care should be taken, and extreme behavior should be avoided (such as consuming one kind of fruit or vegetable species in excess). According to Fabbri et al., vegetables may also contain several antinutrients, as follows: potatoes contain alkaloid solanine, arsenic, and nitrite; green leafy vegetables present toxic oxalates; and peas contain phytic acid, protease inhibitors, and tannins (Fabbri and Crosby, 2016).

According to the European Quality Control System (EQCS), the minimum analyses for authenticity investigations are (Table 11.1):

Other analysis could be:

- delta 18O water at NFC (not from concentrate) juice,
- SGF (Spin Generated Fingerprint) profiling as prescreening,
- risk oriented: flavor analysis (if special flavors are advertised),
- risk oriented: general safety parameters like heavy metals + arsenic, patulin, ochratoxin A, pesticides, ...,
- risk oriented: spoilage parameters like ethanol, lactic acid, ...,
- vitamins if there is a special request,
- Risk oriented further analysis: 13C and other sugars.

Among the many fruit and vegetable beverages recommended for their beneficial effects on the human health, the most used and the most powerful evidence-based effects are presented briefly in the following pages, in alphabetical order.

11.2.1 Acai

Acai berries (*Euterpe oleracea*), originating from South America, considered as a “superfruit,” are extremely high concentrated in anthocyanins, which help a balanced cholesterol levels and acting as

Table 11.1 Investigations for Authenticity Parameters

Parameter	Determination Method
Relative density 20/20	IFU 1
Brix (table)	IFU 3
Soluble solids	IFU 3
Glucose	Enzymatic
Fructose	Enzymatic
Sucrose	Enzymatic
Titrat. acidity expr. as tart. acid pH 7.0	IFU 3
Titrat. acidity expr. as citric acid pH 8.1	IFU 3
Sulfur dioxide, total	IFU 7a
Quinic acid	IC/HPLC
L-malic acid	Enzymatic
Tartaric acid	IFU 65
Citric acid	Enzymatic
Isocitric acid	Enzymatic
L-ascorbic acid	IFU 17
Sodium	AAS
Potassium	AAS
Calcium	AAS
Magnesium	AAS
Nitrate	IFU 48
Phosphate	IFU 36
Sulfate	IFU 50
Sorbitol	enzymatic
Formol number	IFU 30
Proline	IFU 49
Water-soluble pectins	IFU 26
Lactic acid	IFU 53
Anthocyan-finger print	HPLC
Oxalic acid	
D-mannitol	

antioxidants in the body, are rich in plant sterols providing cardioprotective benefits, and help the organism to maintain the cells healthy (Barbosa et al., 2016; Feio et al., 2012).

11.2.2 Apple

Apples (*Malus domestica*) are the fruits specific to the fall season, but also some of the healthiest ones out there. They are loaded with

powerful antioxidants, including quercetin, catechins, phlorizin, and chlorogenic acids that protect against the onset of breast cancer, colon cancer, and help to prevent kidney stones and help to balance the cholesterol. Studies have found that people who eat at least two apples per week can reduce the risk of developing asthma and type 2 diabetes and stimulate lung health. Other authors demonstrated that apple polyphenols are able to influence glucose uptake in the small intestine by inhibiting the activity of glucose transporters ([Manzano and Williamson, 2010](#)).

11.2.3 Apricots

Apricots are the fruits of *Prunus armeniaca*. This fruit provides to the body substantial amounts of vitamin A or beta-carotene ([Mezzomo and Ferreira, 2016](#)). In the body, this precious antioxidant is converted into vitamin A, which helps to maintain skin health, night vision, and supports the body's natural defenses ([Aschoff et al., 2015a](#); [dos Reis et al., 2015](#)). Apricots have from moderate to significant amounts minerals like calcium, phosphorous, manganese, iron, and copper, which can ensure the healthy growth and the development of bones, or act as preventing some age-related disease, like osteoporosis.

11.2.4 Avocado

Avocado (*Persea americana*) is an excellent source of healthy monounsaturated fats, oleic acid, which balance cholesterol and protects against breast cancer. It is rich in carotenoid called lutein, namely vitamin E ([Mezzomo and Ferreira, 2016](#)), whose presence inside a healthy avocado fruit inhibits the development of prostate cancer. Avocado has very high potassium content which is linked to reduced blood pressure.

11.2.5 Blackberries

Blackberries are juicy fruits, which are in the form of a group of small berries growing in bushes or vineyards climbing. Consumption of blackberries gives the body multiple nutritional benefits.

Phenolic acids and flavonoids are phytochemicals common in all species of berries, and especially in blackberries, and may be the compounds that give this fruit its specific health-promoting effect ([Jakobsdottir et al., 2013](#)). The compound with antioxidant activity contained by blackberries ([Wolfe et al., 2008](#)) help the human organism to fight against infectious diseases. Blackberries are usually used as topping for ice cream, yogurt, and desserts, are part of the composition of fruit beverages and jams, but can also be eaten fresh.

11.2.6 Blueberry

Blueberry (*Vaccinium corymbosum*) is in the top specialists' preferences when recommending a health promoting, natural beverage. One cup (250 mL) has a total antioxidant capacity of 13,427—including vitamins A, C, and flavonoids (like quercetin and anthocyanidin). The proportion exceeds 10 times the recommendation of the nutritionists, so, consuming wild berries for sure we can assure the necessary intake of vitamins and antioxidants. In cultivated blueberries, the antioxidants level is around 9000 per cup, but the vitamins proportion is preserved. Beverages prepared from blueberry are useful for vascular system and brain (Rodriguez-Mateos et al., 2012), for blood pressure and arterial stiffness (Johnson et al., 2015), also in the fight against urinary tract infections, CVDs, and in improving memory. As an ingredient of a natural beverage, blueberry will exert an anti-inflammatory and protective action for the retinal structure (Song et al., 2016; Tremblay et al., 2013).

11.2.7 Broccoli

Broccoli (*Brassica oleracea*) has a good reputation for fighting cancer because it contains large amounts of antioxidants and fiber (dos Reis et al., 2015; Popolo et al., 2017). Broccoli exhibits a high content of flavonoid, phenolic compounds, carotenoids, quercetin, and ascorbic acids, with high antioxidant activity (Koh et al., 2009). Due to its content of carotenoids, this vegetable has also been recommended for cataract prevention. The best vegetables to be used for juice extraction should be green, without yellow or dry spots, they should also be firm to touch and not soft. The strain can also be squeezed because it contains plenty of minerals and vitamins.

11.2.8 Brussels Sprouts

Cabbage is rich in vitamins A and C, but Brussels sprouts (*B. oleracea* var. *gemmifera*) exhibit a high concentration of glucosinol, the substance that struggles against cancer and gives these vegetables, their distinctive flavor. A recent study suggests that Brussels sprouts could be protective against A β -induced neurotoxicity, possibly due to the antioxidative capacity of its major constituent, kaempferol (Kim et al., 2013).

11.2.9 Cabbage

Cabbage (*B. oleracea*) is the only vegetable in which vitamin B12 is found, which is recognized for its well-functioning nervous system. Cabbage juice is considered as one of the most effective remedies for

healing vitamin C deficiency. Beverages obtained from cabbage juice have a high content of vitamins, calcium, magnesium, iodine, manganese, sulfur, phosphorus, and copper, and have strong anticancer effects. It is a powerful blood purifier, it is recommended for ulcers, constipation and eruptions of the skin, eczema, colitis, and headache, regulates glycemia as indicated in case of diabetes, balances the nervous system, purifies the intestinal tract, nourishes the tissues in depth, and prevents early aging. Cabbage juice is a food medicine that rebalances the proper functioning of the body.

The most well-known beverage obtained from cabbage is the Sauerkraut. This is a fermented juice, used as a form of preservation of cabbage. It contains a large quantity of lactic acid and tyramines, as well as vitamins and minerals, and has few calories (Raak et al., 2014).

Moreover, Licznarska et al. investigated the chemopreventive activity of cabbage against breast cancer. The aim of the study was to evaluate the effect of raw cabbage and sauerkraut juices of different origins (industrial or organic farming) and their major indole components (I3C—indole-3-carbinol and DIM—diindolylmethane) on aromatase expression in two breast cancer cell lines. The results suggest that chemopreventive activity of cabbage against breast cancer may be partly explained by inhibition of the aromatase expression (Licznarska et al., 2013, 2016).

11.2.10 Carrots

The carrot (*Daucus carota* subsp. *Sativus*) is rich in beta carotene (it has a role in regulating immune processes) and has special effects in the treatment of liver diseases: viral hepatitis, chronic hepatitis, and hepatobiliary insufficiency.

Carrot juice is the most effective therapeutic form of carrot. Carrot contains calcium, copper, iodine, iron, magnesium, manganese, phosphorus, potassium, sodium, sulfur, vitamins A, B, C, D, E, G, and K, and pectins. It is an excellent tonic for many kind of illness. It can be consumed at discretion and in large quantities. It is particularly effective in preventing cataracts and other ocular problems, providing energy and helping to cure certain illnesses quickly. Carrot juice stimulates the immune system helps to treat anemia, circulatory problems, and skin disorders. It is helpful in digestive problems and is an excellent remedy for ulcer, asthma, and liver problems. It helps to prevent dental caries and gum disease. Carrot juice is often used as a base ingredient when preparing mixed beverages juices because it is easy to digest and can be consumed in large quantities. Some indications of this valuable juice: anemia, gastric and duodenal ulcers, colitis, enteritis, diarrhea or, conversely, constipation, hepatobiliary disorders, intoxication, and dermatoses. Other studies show the effect on colon cancer

(Mazewski et al., 2018). Several medical studies conducted in Denmark under the leadership of Kirsten Brandt, of the Danish Institute of Agricultural Sciences, have shown that carotenes slows tumor growth and even prevents their formation. The most powerful antitumor substance that the carrot contains is falcarinol. It was studied as an inhibitor for a protein involved in breast cancer (Tan et al., 2014). In other studies on both cancer cell cultures and laboratory animals, it has been observed that under the influence of this anticancer substance, the growth of various types of malignant cells is inhibited.

11.2.11 Cauliflower

Cauliflower (*B. oleracea*, familia *Brassicaceae*) is rich in vitamins K and C and fiber (dos Reis et al., 2015). Like other cruciferous vegetables, cauliflower glucosinolates help to prevent the formation of certain types of cancer and their treatment (Popolo et al., 2017). Unlike other vegetables, leaves and stems cannot be eaten, but the bouquets can be served raw or cooked.

11.2.12 Celery

Celery (*Apium graveolens*) juice, both from the leaves and root, can be used as such or combined with carrot, lemon, or apple and has numerous therapeutical indications. Celery juice is a liver and kidney drain, tonic of the nervous and adrenal system, depurative, antirheumatic and anti-gout, antiseptic, and regulates blood pressure in hypertensive patients (Nicklas et al., 2015; Tanasawet et al., 2017). Celery juice is best known for its properties to ease rheumatic pain and arthritic inflammation. It is advisable to consume celery juice if you recover from certain diseases and especially after colds or flu, supplementing the lost minerals with celery juice.

Due to the rich content of iron and magnesium, it is precious for purifying the blood. Celery juice contains anticancer substances—phthalide and polyacetylene, which are antioxidants. It is also rich in potassium and sodium and helps to normalize blood pressure and contains the same anti-ulcer and anticancer agents contained in cabbage juice. Potassium from celery helps to lower blood pressure and effectively strengthens the stomach, liver, and kidneys. The main components of celery juice are carotene, vitamins B1, B2, B6, C, and K, niacin, pantothenic acid, folic acid, magnesium, potassium, calcium, very valuable sodium, phosphorus, silicon, iron, manganese, copper, molybdenum, zinc, selenium, and sulfur.

Celery juice is a diuretic and stimulates the elimination of residues through the kidneys, fluidizes the lymphatic system, purifies the digestive tract, and combats hypertension and edema, has a powerful

stimulating effect on the brain and metabolism. Successfully treats sleep disorders. Celery juice has curative effects in combination with carrot juice and apple juice.

11.2.13 Cherries and Sour Cherries

Sweet cherries (*Prunus avium*) and sour cherries (*Prunus cerasus*) contain a high level of antioxidants: anthocyanins that support antioxidant activity and quercetin that help to regulate blood pressure. A recent study shows the antidiabetic potential of sweet cherries (Gonçalves et al., 2017). They are also a good source of fiber, potassium, and vitamins A and C. In addition to the consistent intake of antioxidants, cherry juice is also beneficial by its anti-inflammatory properties at the muscle level (Alvarez-Suarez et al., 2017).

11.2.14 Corn

Sweet corn (*Zea mays* convar. *saccharata* var. *rugosa*) is a subspecies of regular maize with a high sugar content. Even if it is commercially available throughout the year, corn must be consumed especially fresh in the summer. Like other whole grains, it is rich in complex carbohydrates. Sweet corn contains protein and fiber, potassium and vitamin C, and carotenoids (zeaxanthin) but also a variety of minerals (Butnariu et al., 2014). Fresh corn cobs should be preserved covered with leaves that protect the beans from dry air and provide important information about its freshness. If corn has green and damp leaves, it is fresh. The silk from the top of the cob should be dark brown (otherwise it is an indication that the corn was picked up too early). Sweet corn should be consumed immediately after the leaves were removed, so that it does not dry out.

11.2.15 Courgette/Zucchini

The courgette (*Cucurbita pepo* var. *cylindrica*) is rich in starch and a cup of this vegetable contains only 29 calories. It contains lutein, beta-carotene, zeaxanthin—antioxidants that improve vision, but also nutrients such as potassium, magnesium, manganese, fiber, acid folic acid, and vitamins A and C (Deng et al., 2013; Zhou et al., 2013). Nutrients used for prevention of diabetic heart disease and atherosclerosis.

11.2.16 Cranberry

Cranberries species (*Vaccinium erythrocarpum*, *Vaccinium macrocarpon*, *Vaccinium microcarpum*, and *Vaccinium oxycoccos*) are fruits commonly found in the months from October to November and have a lot of unique nutritional properties for the body. A half cup of fresh

cranberries contains 2 g of fiber (mostly insoluble); 9% of recommended daily intake of vitamin C. Cranberries carefully selected, put in plastic bags, and keep in the refrigerator up to 7 days. For long-term storage, place it in the freezer. Cranberries contain about 8900 antioxidants and are especially rich in vitamin C and polyphenols. They are especially recommended for urinary infections because they have been shown to significantly reduce the level of *Escherichia coli* in the urine (Harich et al., 2017). In addition, treatment with cranberry juice treats urinary tract infections and prevents the accumulation of bacteria in the urinary tract (Mathison et al., 2014; Takahashi et al., 2013). Also, cranberry seems to reduce the formation and activity of the mutagens streptococci, thus being important adjuvants in the specialized treatment. The proven ability of cranberries to fight bacteria is an additional stimulus to consume these fruits. Rich in vitamin C, cranberry juice has a significant restorative effect on the immune system. Cranberries based beverages are quite sour and are used for their medicinal benefits rather than for their taste; can be mixed with apple, pear, or grape juice to sweeten.

11.2.17 Cucumbers

Cucumbers (Cucumis sativus) contain ~95% water: a cup of cucumbers slices thirst in the same proportion as a glass of water. There are various varieties of cucumbers. This vegetable contains low amounts of fiber, minerals, and vitamins and beverages prepared with cucumber ingredients are used extensively in skin revitalization, but also helps in digestive problems. Being a good source of potassium (>100 mg/100 g), cucumber-based beverages are taking part in balancing electrolyte levels, in case of dehydration.

11.2.18 Eggplant

Eggplants (*Solanum melongena*) contain phytonutrients with an antioxidant role. They are important in the fight against cancer, have an antimicrobial, antiviral role, and reduce bad cholesterol. The eggplant fruits contain phenolic compound, the most abundant being the chlorogenic acid (Deng et al., 2013). They have a beneficial effect in the heart and contain in their bark a phytonutrient called nasunin anthocyan which gives the specific black color. Nasunin is known as a powerful antioxidant and an aid in the fight against free radicals that protect cell membranes. Small portions of eggplant can be used as ingredients in the mixture for fruit and vegetable smoothies.

11.2.19 Figs

Figs fruits (*Ficus carica*) are a great source of iron, calcium, phosphorus, and fiber (when dry). They are sometimes added in a seasonal

salad with apples and almonds. Fig fruits have been used all over the world to treat various health disorders such as gastric problems, inflammation, and cancer. Phytochemical studies on the leaves and fruits of the plant have shown that they are rich in phenolics, organic acids, and volatile compounds (Mawa et al., 2013). According to Badgujar et al., *F. carica* represents an important source of biochemically active compounds, with practical applications in the prevention and treatment of various ailments such as anemia, cancer, diabetes, leprosy, liver diseases, paralysis, skin diseases, and ulcers (Badgujar et al., 2014). Fig fruits can be used as an ingredient for fresh smoothies.

11.2.20 Kiwifruit

The kiwifruit (*Actinidia chinensis*) is also named kiwi or Chinese gooseberry. These small fruits contain plenty of antioxidants and phytonutrients that protect the DNA. Maintain blood glucose levels under control, protect the heart and colon (Wang et al., 2014), prevent asthma, and fight against macular degenerative diseases. They can also reduce the risk of blood clots.

Kiwi are very tasty, eaten as such or can be added to salads, along with cold soups or in fruit tart composition. The fruit is ripe and ready to be eaten when it is slightly soft under a slight pressure exerted by the finger. If it is very soft, it is too ripe and is no longer good for eating.

11.2.21 Leek

Related with onion, leek (*Allium ampeloprasum*) is available throughout the year, although its flavor is the deepest spring and autumn. Leek, like onion, is a rich source of prebiotics that helps to regulate bowel function. Leek is an excellent source of vitamin K. Also, it contains vitamins B6, C, and A, manganese, copper, iron, and folate.

11.2.22 Lemon

Studies have shown that citrus fruits can attenuate the progression and onset of cancer and CVDs, although not many reports address the effects they have on vascular remodeling. Other study shows that the juices containing *Citrus iyo* presented a stronger inhibitory effect on neointima formation than the one containing *Citrus unshiu*, but overall proving that citrus fruit juices have inhibitory effects on oxidative stress, thus attenuating vascular remodeling (Ohnishi et al., 2015). It is a good white cell activator, an excellent anti-inflammatory, and a good liver decongestant. It is used with good results in the treatment of jaundice, liver congestion, liver, and pancreatic insufficiency. Also, it can be used in the management of diabetes (Aruoma et al., 2012).

11.2.23 Mango

Mango (*Mangifera indica*) is a fruit that naturally has a cool effect in the body. Beverages prepared from mango will have an important content of vitamins A and C and beta-carotene, which were reported to be useful in preventing cancer (Bunea et al., 2008) and support skin health.

11.2.24 Mushrooms

They are rich in niacin and riboflavin, vitamin B (less common in other foods). Helps in the growth and production of red blood cells and treats high cholesterol levels. Lentinan is a type of sugar molecule found in the composition of shiitake mushrooms, which can slow the growth of some form of cancer (Ina et al., 2016).

11.2.25 Oranges

Oranges (*Citrus sinensis*) are considered to be the fruits of winter and are found from December to April in groceries. An average orange, 5.5 cm diagonal, contains: 3.5 g of fiber (soluble and insoluble); 11% of recommended daily intake of vitamin B1 and folic acid; and 107% of recommended daily intake of vitamin C. Oranges resist long enough at room temperature, but if kept in the refrigerator, it can last up to 3 weeks. Oranges can be used in many ways and almost all parts of it, including the peel, can be used. But most often they are consumed without peel, fresh or in the form of juice.

Rich in vitamin C, fiber, calcium, and vitamin D, orange juice contains essential nutrients and fortifying substances for the bone system. Peel oranges is often put in drinks made from other fruits. Aschoff et al. compared the bioavailability of β -cryptoxanthin from either fresh navel oranges (*C. sinensis* L. Osbeck) or pasteurized orange juice. From their studies, orange juice represents a more bioavailable source of β -cryptoxanthin than fresh oranges (Aschoff et al., 2015b). In others studies on content from freshly squeezed, flash-pasteurized, and pasteurized juices (Aschoff et al., 2015a) assumed that the higher hesperidin level in orange fruits compared to orange juice offers only a limited nutritional benefit.

11.2.26 Parsley

The parsley (*Petroselinum crispum*) is effective in rickets. The parsley also has essential properties in oxygen metabolism, in maintaining the normal functioning of the adrenal and thyroid, in maintaining the health of the blood vessels, especially the capillaries, is excellent for genitourinary tracts, a great help for kidney and gallbladder stones; is

effective in eye disorders, regularly consumed also has effects to prevent premature aging. Parsley juice is an excellent antiseptic of both the blood and intestines, and some therapists consider it as a very good preventative of cancer.

Parsley juice or parsley-based beverages can be obtained from two splashes of well-washed parsley and a glass of water. The whole mixture is mixed for 2 min and then allowed to macerate 10 min before being consumed on the empty stomach. Parsley juice is a powerful immune and liver function stimulant, has antibiotic and antiviral effects. Recent studies have shown that parsley has an unusual effect in fighting against viruses that attack the liver. Hepatitis A, B, and C patients are recommended to make a 4 weeks cure with fresh parsley leaf juice. Can be used successfully and parsley root in salads or juice. The parsley root juice is obtained with the centrifugal electric juicer. Drink 50 mL (one quarter of cup) a day in combination with carrot juice. Treatment activates the immune system, helping the body to fight against hepatitis viruses and, moreover, has a direct action of inhibiting the multiplication of these viruses.

11.2.27 Pears

Even if there are more autumn fruits, some types of pears are also found in the winter months.

Pears contain more fiber than apples, a comparable level of vitamin C, few calories, and carbohydrates. The risk of stroke can be reduced by daily intake of fiber-rich food like pears with up to 50%. Pears can be kept at room temperature, but because they ripen very quickly, it is preferable to store them in the refrigerator, which is designed to stop the ripen. The pears contain antioxidant and flavonoid which can induce anti-inflammatory effects in the body generated by arthritis, rheumatic conditions, gout, and similar conditions ([Baiano and Del Nobile, 2016](#)). The pears mineral content is high and includes magnesium, calcium, manganese, phosphorus, and copper. These mineral aids in reducing bone mineral loss being useful in conditions like osteoporosis ([Carluccio et al., 2016](#)).

11.2.28 Peaches

With the exception of amazing aroma, peaches are rich in vitamins A and C and potassium. Potassium-rich beverages are known to help in the reduction of blood pressure ([Binia et al., 2015](#)). Peaches are an important source of antioxidants, beta-carotene (the one that offers yellow color), and flavonoids, which can help to slow the aging process by reducing the risk of certain types cancer and CVDs. The beta-carotene also nourishes and protects the retina ([Mezzomo and](#)

[Ferreira, 2016](#)). Also is helping to prevent age-related macular degeneration and cataracts. In addition, each peach has only 60 calories, is rich in fiber and is fat-free.

Choose scented peaches and avoid the very soft ones. The red color does not necessarily mean that the peach is very ripe, and this is only specific to certain varieties. Avoid green or very hard peaches.

11.2.29 Pepper/Capsicum

Pepper (*Capsicum* sp.), green, yellow, or red gives a touch of color and taste in our food. The taste of this vegetable ranging from slightly spicy or very spicy to the refreshing, slightly sweet.

Peppers are an excellent source of vitamin C (100 g of hot pepper contains 140 mg of vitamin C). Beta carotene (vitamin A) levels of hot pepper are very high, reaching up to 1300 µg, being slightly lower in sweet pepper. The mixture of vitamin C and beta carotene may be useful for cataract prevention as well as cardiovascular system diseases ([Aschoff et al., 2015a](#)).

11.2.30 Pineapple

Pineapple (*Ananas comosus*) is a warm seasonal fruit, has a dense texture, is rich in vitamins, enzymes, and antioxidants ([Hossain et al., 2015](#)). Pineapple has an anti-inflammatory effect, protects against colon cancer ([Gani et al., 2015](#)), macular degeneration, and arthritis. One of the enzymes that pineapple contains is bromelain. Bromelain is a cysteine protease found in pineapple tissue with anti-inflammatory and anticancer activities. Also has the ability to induce apoptotic cell death ([de Lencastre Novaes et al., 2016](#)).

11.2.31 Plum

The plums are fruits of the tree *Prunus domestica*. These fruits contain many fiber and a natural laxative, called sorbitol. In addition, plum juice also provides antioxidants ([Wolfe et al., 2008](#)), iron, potassium, fluoride, phosphorous, magnesium, calcium, and zinc. The plums contain vitamins A, B1 (thiamine), B2 (riboflavin), B3 (niacin), B-6, vitamin C (ascorbic acid), vitamin E (alpha-tocopherol), vitamin K (phylloquinone), and folate. They also offer very low calories without any harmful fats.

11.2.32 Pomegranate

Pomegranate is one of the most nutritious fruits of the autumn-winter period (October-December). One pomegranate contains: 1 g of fiber (mostly insoluble); 12% of recommended daily intake of vitamins

B6 and C and potassium. Pomegranate can be kept at the room temperature for a week or for 2 weeks if you keep it in the refrigerator.

Fruits that bring multiple health benefits, pomegranates are rich in antioxidants that can reduce the risk of cardiovascular complications such as heart attacks (Wang et al., 2014). Also, pomegranates may help in the prevention of breast cancer (Mandal et al., 2015) or colon. Despite the numerous calories they provide, pomegranate juice offers a very generous amount of antioxidants that protect brain cells and have anticancer properties (Wolfe et al., 2008). Recommended for both therapeutic and aesthetic reasons, pomegranate juice is beneficial for heart health, but also for treating cancer or inflammation. It also contributes in maintaining cell health, which is important for people who want to keep their young look as long as possible. Some studies on human prostate cancer cells show the effectiveness of the pomegranate extract against prostate cancer (Wang et al., 2014).

11.2.33 Pumpkin

The pumpkin is rich in alpha and beta carotene that can be converted into retinol, which helps to improve vision and increase cells (Deng et al., 2013). Pumpkin seeds are a good source of alpha-linoleic acid, a fatty acid omega 3 that could be useful for people suffering from CVD, hypertension, high cholesterol, or liver cancer (Shen et al., 2017).

11.2.34 Red Beetroot

The main components of red beet juice are carotene, vitamins A, B1, B2, B6, C, and E, folic acid, niacin, pantothenic acid, choline, calcium, silicon, magnesium, phosphorus, potassium, oxalic acid, zinc, cobalt, molybdenum, lithium, selenium, manganese, rubidium, aminoazines, flavonoids, and betanin. Red beet juice has strong healing effects, being a precious adjunct with antibacterial, anti-sclerotic effects to stimulate the immune system. It also helps to stimulate diuresis and restore intestinal flora. According to Singh (Bhupinder and Bahadur, 2014), betalains and phenolic compounds that exist in red beetroot have been reported to increase the resistance of low-density lipoproteins (LDL) to oxidation and to prevent cancer and CVDs by reducing the oxidative effect of free radicals on lipids.

Other studies confirmed also the beetroot content of betaxanthins and betacyanin of the betalain family, betalains as health protective molecules in beetroots. Therefore, betalains are related to anti-oxidative stress, anti-inflammation, and antitumor effects of beetroots (Ninfali and Angelino, 2013).

It is also indicated in case of anemia, demineralization, tuberculosis, neurosis, and menopausal disorders. Due to its strong taste, it must be mixed with other juices. The curative effect of beet juice

can be enhanced by combining red beet juice with carrot juice, celery, or apple juice.

Within this context, red beetroot (*Beta vulgaris* L.) is preferred as a rich source of betacyanin, having the group of reddish to violet betalain pigments which are majorly composed of betanins and isobetanins (Guldiken et al., 2016).

Red beet stimulates hematopoiesis (red blood cell formation, white blood cells, and platelets), remineralizes the body, and stimulates the conversion of glucose into glycogen in the liver. It was experimentally demonstrated that beetroot has the potency to preserve bone marrow integrity and stimulate the differentiation of HSCs (hematopoietic stem cells) against ionizing radiation (Cho et al., 2017).

Red beet juice has a strong effect on the body and should be consumed in small quantities and mixed with other fruit and vegetable juices. It is an excellent blood purifier and is effective in cleansing the liver, kidneys, and arteries. Kujawska et al. investigated the implication of beetroot juice in protection of Wistar rats from oxidative stress induced by carbon tetrachloride (CCl₄). They observed that the beetroot juice reduced plasma protein carbonyls and DNA damage in blood leukocytes (Kujawska et al., 2009).

Red beet juice provides energy because of the high levels of natural sugars it contains, although it should be avoided by those who suffer from diabetes. It is also indicated for digestive problems such as constipation, and strengthens the bones, which is very useful for older people whose bones become more fragile. It is also helpful in treating liver disease (Clifford et al., 2015).

Red beet juice should be consumed in combination with other vegetable juices (preferably carrot), in appropriate proportion to avoid any negative reactions of the body. For example: a portion of beets juice (50 mL), two or three parts carrot juice (100 or 150 mL), and lemon juice to correct the taste.

11.2.35 Red Grapes

There are currently more than 300 studies that cite the beneficial effects found to be induced by the consumption of natural grape juice, as well as vegetal oils obtained from grape seeds or the skin of these fruits. Red grapes contain many types of antioxidants, mainly flavonoids such as anthocyanins and catechins that are of medical importance in the treatment of diabetes and CVDs (Li et al., 2014).

Studies have concluded that if grape-derived products are administered to laboratory animals, a reduction in the tendency for vascular thrombosis may occur. And these results have recently been extrapolated to human subjects. This observation is the basis of the “French paradox,” a theory published in the early 1990s, which was based on

the observation that the French suffer from fewer cardiac conditions than the rest of the European population.

Initially, the explanation seemed incredibly, but in time it was proved to be true: the protective effect against these diseases is due to the consumption of red wine in moderation. It is known that the French are used to drink a glass of red wine at the table, and it is that keeps their vascular tonus in normal parameters for longer time (Galinski et al., 2016).

In addition to reducing platelet aggregation, polyphenols in grapes also have other benefits, such as:

- significantly reduce the susceptibility of endothelial lesions;
- reduce angiotensin activity, an endogenous substance that can cause vasoconstriction and hypertension (Neto et al., 2017); and
- increases production of vasodilators, especially nitric oxide.

The content of antioxidants in grapes is very important. Resveratrol-like substances (an antioxidant polyphenol) have been correlated in many studies with protective effects against various neoplasias, cardiovascular disorders (Blumberg et al., 2015), neurodegenerative disorders including Alzheimer's disease, and viral infections. This antioxidant seems to have beneficial roles in retarding the aging of the body, reducing the incidence of diseases induced by cellular and tissue degeneration: heart and muscle diseases in particular. Resveratrol is also found in abundance and in berry-like fruits, especially in raspberries and mulberries, not just in red grapes.

Many of the types of flavonoids that are found in grapes (both in white and red and in rosé) can be found in both green and black tea, but also in black bitter chocolate. However, the content of these products in antioxidants remains inferior to berries and grapes, and research to determine their bioavailability is still ongoing. Specialists believe that flavonoids favorably stimulate heart function and maintain normal vascular tonus, prevent clotting of clots that may favor acute myocardial infarction or stroke, prevent cholesterol deposition on vessel walls with atherosclerosis, and promote at the same time maintaining the elasticity and flexibility of the vessels for a much longer time (Levantesi et al., 2013).

Grape juice has similar antioxidant properties. One study has shown that by consuming a large glass of grape juice every day, LDL cholesterol (the one that negatively influences the health of the body) can be reduced. It also can improve systemic vascular tonus and stimulate normal blood flow. In addition, grape juice does not have the same contraindications as wine and cannot cause negative effects if it is consumed “abusively.”

Antioxidant concentration varies significantly depending on the type and species of grapes, and in some cases, grape juice may be richer in vitamins compared to fresh grapes. However, nutrition

experts advise that it is best to choose fruit instead of juices, because in juices not only vitamins are more, but also calories.

The red grape juice, prepared in its entirety (seeds, pulp, and grains), provides flavonoids and resveratrol, two powerful antioxidant substances, with antitumor and healing effect for a wide range of conditions. Red grape juice consumption reduces the risk of blood clots, lowers cholesterol, and maintains healthy blood pressure (Aubert and Chalot, 2018).

An assessment on how are affected the chemical composition (quantitative and qualitative) and the functionality (in vitro and in vivo) of juices based on the producing region, variety, and farming system of grapes (conventional, organic, and biodynamic) shown that the effects of these variable on the chemical composition (especially phenolic compounds) and functional properties of juices are remarkable (Granato et al., 2016). The basic steps to produce grape juices are shown as a flowchart in Fig. 11.2.

11.2.36 Red Raspberry

Succulent, sweet and cool, delicious raspberries (*Rubus idaeus* L.) can be introduced into the daily diet, fresh, as well as in the composition

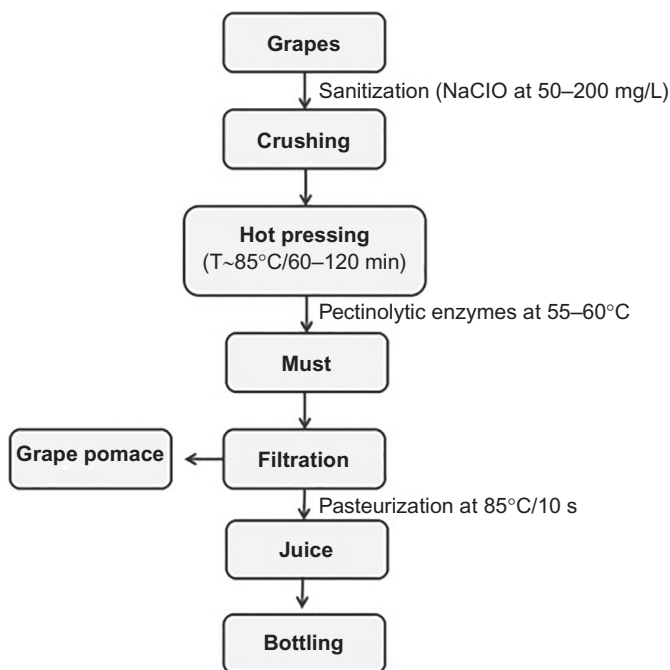


Fig. 11.2 Steps and unit operations used in hot-pressing method for producing the grape juice.

of various desserts. Raspberry is rich in fiber, some of which are soluble—in the form of pectin, which helps to lower cholesterol, being an excellent source of vitamin C. The red color of raspberries is provided by the high level of anthocyanins (antioxidants). Known as the “golden fruit,” red raspberry is rich in anthocyanins with documented biological activities of medical importance especially CVD, cancer, all of which share critical metabolic, oxidative, and inflammatory links (Teng et al., 2017).

According to Ludwig et al. (2015), red raspberries (*R. idaeus* L.) are a rich source of polyphenolic compounds, the main components being anthocyanins and ellagitannins.

11.2.37 Spinach

Spinach (*Spinacia oleracea* L.) is a nutrient-rich leafy vegetable. It contains at least 13 different flavonoids that function as antioxidants and anticancer agents (Roberts and Moreau, 2016). Spinach contains vitamin K and carotenoids (Bunea et al., 2008) useful for bone and heart protection, useful for eye diseases such as cataracts and macular degeneration (occurring with age). Moreover, it protects the brain from oxidative stress and reduces the negative aspects of aging, which contribute to the decline of brain function (Fornaciari et al., 2014). According to Jiraungkoorskul, spinach may be used in the prevention of Alzheimer's disease (Jiraungkoorskul, 2016). With few calories and rich in vitamins, spinach is one of the most important nutritious foods. A cup of spinach leaves contains more than the recommended daily dose of vitamins K and A, manganese and folic acid, and about 40% of the magnesium body requirement. It is an excellent source, which contains over 20 different nutrients, including dietary fiber, calcium, and protein. And yet, a cup has only 40 calories.

11.2.38 Sea buckthorn

Beta-carotene in the sea buckthorn (*Hippophae rhamnoides*) has synergic action with interferon. Sea buckthorn contains many immunostimulant substances, the use of juice with great results in the treatment of hepatic diseases (hepatitis and cirrhosis), diabetes (Xue et al., 2015), liver cancer (Guo et al., 2017) and contribute to a general improvement of health.

11.2.39 Sweet Potatoes

These orange vegetables have the best taste during autumn (their peak season). Like the pumpkin, sweet potatoes (*Ipomoea batatas*) are rich in beta-carotene, which can prevent vitamin A deficiency, help to maintain vision health and generate retinol production

(Mezzomo and Ferreira, 2016). Sweet potatoes are also a good source of vitamin C (Deng et al., 2013). Portions of boiled or oven-cooked sweet potatoes may be used as ingredients for combined smoothies.

11.2.40 Tomatoes

Known as the “apple of love,” tomatoes (*Solanum lycopersicum*) are worthy of this name. They are full of nutrients and are loaded with a special flavor. A fresh medium-sized tomato is an excellent source of vitamins A and C. Seasonal tomatoes contain twice as much vitamin C as those available at other times of the year. Tomatoes contain lycopene and carotenoids, which are helpful in prevention of certain types of cancer, especially prostate cancer. In a study conducted at the Cambridge University Hospitals, a conclusion was that lycopene improves endothelial function in CVD patients (Gajendragadkar et al., 2014). Cherry tomatoes are delicious served in salads or in snacks composition. Some type of cherry tomatoes has fewer seeds than other varieties and is recommended for cooking sauces and cooked foods. Tomatoes can have different shapes, sizes, and colors. Refrigeration destroys the aroma of tomatoes. Thanks to the sun, tomatoes contain many nutrients and are therefore extremely beneficial to the body. They are excellent for blood and are a good tonic for the nervous system. These are particularly beneficial for people who suffer from anxiety, stress, nervousness, insomnia, and fatigue. The active compounds that this vegetable contain exhibited the ability to remove uric acid from the organism. Tomatoes based beverages are recommended for arthritis, gout, and rheumatism.

The red juice, besides vitamins A, B, C, and E, and iron, phosphorus, potassium, and sulfur minerals, contains lycopene, a red dye with antioxidant and antitumor properties. It prevents the development of cancerous cells in prostate cancer, bladder, pancreas, breast, lungs, or skin. There are studies which show that lycopene can be useful in preventing and stopping ovarian, intestinal, cervical, or uterine cancer from evolving. Lycopene is also useful in lowering cholesterol levels (Carluccio et al., 2016). Tomato juice has detoxifying properties and can help in skin problems such as acne or furuncles. Tomato juice can be consumed simply or in combination with carrot juice, apple, celery, or onion juice.

11.2.41 Watermelon

Scented, sweet, red watermelon (*Citrullus lanatus*) is refreshing and easy to digest. It contains more lycopene that fights cancer per serving, than tomatoes: about 40%. Lycopene present in watermelon is easy to absorb without requiring high-temperature treatment, unlike tomato and is relatively stable when watermelons are stored

and refrigerated. Watermelon is a rich source of vitamins A and C, it contains vitamin B6, beta-carotene (Mezzomo and Ferreira, 2016), thiamine, and potassium. The watermelons you eat must be hard and symmetrical, not cut or with traces of blows. It is a good source of citrulline which participates in lowering blood pressure. In some studies, watermelon juice intake has been linked with reduced insulin resistance, which is helpful to combat the metabolic syndrome and type 2 diabetes (Xue et al., 2015).

11.3 Antioxidants in Fruit and Vegetables

Antioxidants are actually natural compounds that can be found in fruits and vegetables and have an important role in stimulating and promoting the health of the body and in helping it to cope with both internal and external environmental attacks. They comprise a large class of compounds, including, vitamins, minerals, and polyphenols (Fig. 11.3).

The contribution of natural antioxidants in the prevention and treatment of diseases is of primordial importance. With such allies, the immune system can fight and neutralize the aggression much faster and thus prevent the emergence of imbalances that translate into body homeostasis through illness, inflammation, degenerative processes, aging, and even abnormal cell activations and replications (characteristic of cancers).

Experts believe that antioxidants are substances capable of counteracting the harmful effects of toxic metabolites resulting from both endogenous processes (as products that the body needs to discard) but which are also present in the external environment as a result of pollution. These products are called oxygen-free radicals and have a very high chemical reactivity, being able to determine impulsive cellular lesions, culminating even with the death of the cells they act on. The most important free radicals known to date are superoxide and

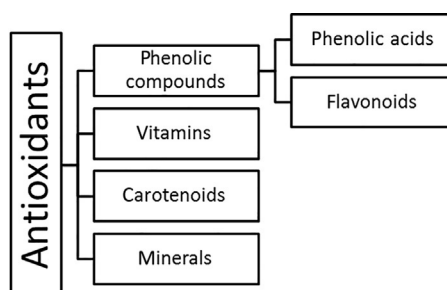


Fig. 11.3 Main classes of antioxidants.

hydroxyl. As the name says, they are derived from oxygen, but they get properties that make it very toxic.

The oxidation process can evolve in cascade: it is enough for a cell to be prone to the action of these metabolic products, then to expand the process and thus to lay the foundations for disease or even cancer. It is already known that in fact, cancers arise as a result of internal imbalances culminating in the undesirable interaction between these free radicals and cellular DNA, resulting in mutations. Free radicals are also criminalized in the processes of general aging of human organism, as well as in more specific disorders: atherosclerosis, liver disease, pulmonary emphysema, Parkinson's disease, Alzheimer's disease, and schizophrenia.

In certain concentrations, free radicals have neutral effects and do not harm the body, not being able to induce serious injuries. In addition, the body seems to have a number of own mechanisms to fight them (mainly represented by enzymes that can neutralize them). But it is very important for our daily diet to offer new and new allies. The most impressive are the antioxidants ([Baiano and Del Nobile, 2016](#)). They play the most important role in providing protection against these harmful oxygen species. Most of the time the most important antioxidant action is vitamins A, E, and C and polyphenols. They seem to be able to inhibit oxidation reactions and remove tissue and metabolic intermediates from tissues. Antioxidant compounds found in fruits are: ascorbic acid (vitamin C), vitamin E (tocopherols and tocotrienols), polyphenols (such as flavonoids and resveratrol), and carotenoids.

The most important sources of antioxidants are found in nature, in complex forms and never alone. The poly-vitamin complexes provided by fruits and vegetables are very beneficial to the whole body and can help to stimulate the immune system so we can get protection against a wider range of conditions. Over time, specialists have analyzed the antioxidant content of over 100 fruits, vegetables, cereals, nuts, and spices, but the results have always been similar: the richest in antioxidants are berries.

Over the time, extensive research work has been done to investigate the antioxidants content in food sources such as fruits, vegetables, edible flowers, and mushrooms.

The antioxidant capacities and total phenolic contents of extracts of 56 commonly consumed vegetables were studied by [Deng et al. \(2013\)](#). Of course, the different species of vegetables investigated exhibited diverse antioxidant capacities. However, the highest antioxidant capacities and phenolic contents were found in Chinese toon bud, loosestrife, perilla leaf, cowpea, caraway, lotus root, sweet potato leaf, soy bean (green), pepper leaf, ginseng leaf, chives, and broccoli, while the values were very low in marrow squash and eggplant

(purple). These vegetables species also had a high content of phenolic compounds such as chlorogenic acid, gallic acid, and galangin (Deng et al., 2013).

Antioxidants play an important role in recovering free radicals and maintaining a proper balance of human organism. The use of synthetic drugs to maintain the healthy state of the population and for the disease prevention is apparently not an optimal choice. The search for natural antioxidants to replace synthetic antioxidants is not just the trend of pharmaceutical and health industries, but also the demand for nutritionist experts, including the new development direction of the food industry.

Antioxidants play an important role in scavenging free radicals and maintaining body balance. Here, we discussed the contribution of natural antioxidants in diseases prevention and treatment. In modern life in which nature is advocated, the application of synthetic drugs for the health care and prevention of diseases apparently is not an optimum choice. Searching natural antioxidants to replace synthetic antioxidants is not only the trend of pharmaceutical and healthcare industries, but also the demand of Food Nutriology, even the new development direction of food industry. Traditional Chinese herbs have attracted more and more attention from scholars at home and abroad, especially, the treatment efficacy of diseases and healthcare functions as well as the bioactive components of these natural herbs. More and more bioactive components have been isolated and identified, which enables traditional Chinese medicine to be an important development direction of modern medicine and healthcare products. In addition, some scholars have isolated bioactive substances with strong antioxidant function from fungi, yeast, and algae. Natural antioxidants can be used as natural food additives with the new concept of natural healthcare concepts in food processing and preservation, which will better meet with the demands of modern society. The extraction and preservation process of natural antioxidants is the development target for the future food and medical healthcare industries. The innovation and improvement in analysis and extraction technology of natural antioxidants in foods is also an urgent matter during the development of related industries (Li et al., 2014).

Saikia et al. selected 13 fruits from the region Assam, India to study their phytochemical content and antioxidant activity. Their results shown that black jamun has highest total phenolic content followed by litchi, bogi jamun, amla, hog plum, pani jamun, and carambola. The highest ferric reducing antioxidant potential was found in Amla. DPPH radical scavenging activity of amla, black jamun, hogplum, litchi, and ponjol was above 90%. The highest values for metal chelation capacity were found in ponjol, carambola, and leteku. The fruit extracts were studied at RP-HPLC (reversed phase high-performance

liquid chromatography) and the results showed the presence of ascorbic acid, phenolic acids, and flavonoids with a different composition and content depending on the fruit type (Saikia et al., 2016).

Below there is a list of the best ingredients for vegetable juices and the health disorders that can be treated with them (Table 11.2).

Table 11.2 Health Disorders and Vegetable Beverages Recommended

Health Disorder	Fruits and Vegetables Recommended
Acidosis	Carrot, beet, cucumber, and spinach
Acne	Carrot, lettuce, and spinach
Anemia	Beet, celery, and carrot
Allergies	Carrot, lettuce, and spinach
Appendicitis	Carrot, beet, and spinach
Atherosclerosis	Carrot, celery, lettuce, and spinach
Arthritis	Cucumber, beets, celery, carrot, and watercress
Asthma	Carrots, radishes, and celery
Bronchitis	Tomatoes, carrots, onions, and spinach
Colds	Carrot, celery, onion, and spinach
Constipation	Carrot, beet, spinach, and watercress
Colitis	Carrot, beet, cucumber, and spinach
Diabetes	Carrot, celery, lettuce, watermelon, and spinach
Dyspepsia	Carrot, beet, cucumber, and spinach
Eczema	Carrot, spinach, cucumber, and beets
Epilepsy	Carrot, celery, and spinach
Visual disturbances	Tomatoes, carrot, celery, parsley, and spinach
Fatigue	Carrot, spinach, beets, and cucumbers
Gout	Tomatoes, cucumbers, beets, carrots, celery, and spinach
Headaches	Carrot, lettuce, and spinach
Heart diseases	Carrot, beet, cucumber, and spinach
Hypertension	Carrot, spinach, beets, and cucumbers
Flu	Carrot, onion, and spinach
Insomnia	Lettuce, carrot, and celery
Jaundice	Carrot, celery, spinach, beets, and cucumbers
Obesity	Tomatoes, beets, cabbage, lettuce, spinach, and carrot
Hemorrhoids	Carrot, spinach, ham, and toast
Sinusitis	tomato, carrot, onion, and spinach
Tonsillitis	carrot, spinach, beets, and cucumbers

11.3.1 Juice with Red Beetroot, Apples, and Carrots

A beverage with anticancer properties. Apples protect the stomach from harmful bacteria and lungs from the harmful effects of cigarette smoke. Red beetroot stimulates the formation of red blood cells and cleanses the liver. Lemon gives beneficial effects: it removes toxins from the liver, improves the function of the bile, favors the absorption of minerals, and purifies the blood.

Ingredients:

2 apples

3 carrots

½ red beet

½ lemon

Mix in a blender apples, carrots, red beets, and lemon. The composition is squeezed, served in a high glass, and seasoned with a slice of lemon.

11.3.2 Ginger and Pineapple Juice

A combination that helps for detoxification. It's a real package of vitamins, minerals, fiber, and enzymes that revitalize the body help in weight loss diets and in the treatment of candida.

Ingredients:

1 small pineapple

juice from ½ lemon

1 teaspoon of freshly chopped ginger

a handful of parsley, cilantro (coriander leaves), and fresh spinach

100 mL of water

Put all the ingredients in a blender, and complete with water. Water can be replaced with a few pineapple slices.

11.3.3 Apple and Carrots Juice

8 carrots

2 apples

ginger

The washed carrots and apples are squeezed in the extractor. A teaspoonful of chopped ginger is added. This beverage is best to be served cold.

11.3.4 Other Combinations

- 2 peaches, 1 apple, 1 per
- 6 strawberries, 1 apple, half orange
- 1 kiwi, half of mango, 1 orange, mineral water as desired

- 1 apple, 4 small carrots, 1 celery stalk, half lemon, one-quarter of cucumber
 - 1 apple, 3 medium carrots, half pepper, 4 lettuce leaves, half lemon, 1 tomato
 - half a cup of fresh broccoli, 1 apple, 3 small carrots, a handful of parsley, half lemon (very rich in calcium)
 - 2 medium carrots, 1 celery stalk, 1 small potato, 1 apple, half lemon
 - maximum energy: 3 carrots with skin, 1 apple with skin, 2–3 celery stalks, 1 small orange (160 calories, 3.1 g fiber, 36 g carbohydrate, 0.9 g fat, 22.5 mg folic acid, 3451.3 mg vitamin A, and 21.8 mg vitamin C)
- Based on the biological compounds content, and the existing synergies between them, below are presented a few recipes for beverages that can be prepared from fruit (Table 11.3), vegetables, or mix of them (Table 11.4).

Table 11.3 Recipes for Fresh Fruit Beverages

Fruits name	Recipe
Apples-apricots-peaches	One fruit of each goes through the juicer, then serves.
Apples-berries	1 Cup of strawberries, raspberries, blueberries are squeezed together with 2 apples.
Apples-grapes-lemon	2 Apples, one cup of grapes, 1/4 lemon are squeezed together.
Apple-pear-ginger	3 Apples + 1 pear + 1 slice of ½ cm fresh ginger.
Banana-melon	Squeeze ½ melon, then pour the juice into the blender and add a banana, then mix.
Berries	½ Cup berries, ½ cup strawberries, ½ cup other berries, 1 apple or 1 pear
Melon-watermelon	½ Melon + watermelon by wish
Grapes-grapefruit	1 Cup grapes + 1 grapefruit
Grape-lemon-pineapple	1 Cup grapes + ¼ lemon + ½ sliced pineapple
Grapefruit-orange	½ Grapefruit + 2 oranges
Kiwi-Orange	3 Kiwi + 2 oranges
Lemonade 1	4 Apples + ¼ lemon are squeezed and served with crushed ice
Lemonade 2	1 Cup white grapes + ½ lemon + 2 oranges are squeezed and mix with 125 mL of carbonated mineral water.
Lemonade 3	1 Slice of ½ cm ginger + 1/4 lemon + 1 green apple + 125 mL carbonated mineral water. Juice is useful for intestinal disorders.
Apricot-mango-orange	4 Apricots + 1 mango + 1 orange are squeezed in the mentioned order
Plum-apple-pear	2 Plums + 2 apples + 1 pear squeezed together are very useful for regulating intestinal transit in people who suffer from constipation.

Continued

Table 11.3 Recipes for Fresh Fruit Beverages—cont'd

Fruits name	Recipe
Grapefruit-raspberry	1 Cup of raspberries + 1/2 grapefruit. Juice is useful in weight loss diets
Cranberry-apple-orange	1 Cup cranberry + 2 apples + 1 orange
Cranberry-lemon-grape-apple	Squeeze 1/2 cup of cranberry, then add 1/2 lemon, a cup of grapes and two apples.
Pineapple-kiwi-mint-ginger	Squeeze first a slice of ginger 1/2 cm, 1/2 cup of mint, then 1 kiwi and 1/4 pineapple. The juice is useful in intestinal spasms, bloating.
Mint-kiwi-green apple	Squeeze first a cup of mint, then 2 kiwi and then 1 green apple.
Exotic juice	1/2 Mango + 2 oranges + 1/2 papaya + 1/4 pineapple squeeze, then place in the blender with 1 banana.
Apple-carrot-ginger	1 Slice of 1/2 cm of ginger is squeezed, and then adds 1 apple and 4 carrots. Frequently used, the drink plays a role in lowering cholesterol levels.
Orange-pineapple-strawberry-banana	1 Orange + 1/2 pineapple + 1/2 cup strawberries are squeezed then put in the blender along with 1 banana.
Melon-strawberry	1/2 Sliced melon + 1 cup of strawberries. Juice can also be made from frozen fruits.
Lemonade with ginger for the cold	Juice from 1 slice of 2.5 cm ginger + 1/4 lemon and add it to a cup of hot water. Sweet with honey to taste. Drink has a diaphoretic effect (heats the body and facilitates sweating)
Cranberry-pineapple-banana	Squeeze the sliced 1/4 pineapple juice and insert it into the blender with a blueberry mug and a banana.
Apple-pear-kiwi-ginger	2 Apples + 1 pear + 2 kiwi + 1 ginger slice of 0.5 cm

Table 11.4 Recipes for Beverages Prepared from Vegetables of Fruit-Vegetables Mix

Vegetables name	Recipe
Beet-carrot-apple	1/2 Red beet + 4 carrots + 2 apples
Beet-carrot-parsley	1/2 Beets + 4 carrots + 1/2 cup of parsley
Carrots- spinach-beet	1/2 Beets + 3 carrots + 1/2 spinach cup
Broccoli-carrots-celery	1 Rod of broccoli + 3 carrots + 1 stick of celery
Broccoli-carrots-parsley	1 Rod of broccoli + 3 carrots + 1/2 cup of parsley
Cabbage-carrot-parsley	1/2 Cabbage + 3 carrots + 1/2 cup of parsley

Table 11.4 Recipes for Beverages Prepared from Vegetables of Fruit-Vegetables Mix—cont'd

Vegetables name	Recipe
Cabbage-carrot-celery	½ Cabbage + 2 carrots + 4 celery stalks are squeezed together. Juice is useful as an adjuvant in the treatment of peptic ulcer.
Carrot-cucumber-parsley	4 Carrots + ½ cucumbers + ½ cup of parsley
Carrots-spinach-dandelion	4 Carrots + 1 dandelion root + ½ cup of spinach
Carrot-leaves of dandelion-celery	5 Carrots + ½ cup dandelion leaves + 2 celery stems. This juice has a diuretic effect.
Carrots-apple-beet-dandelion	1 Dandelion root + ½ beets + 2 carrots + 1 apple. This recipe improves the function of the liver.
Parsley-celery-cucumber-spinach	4 Celery stalks + ½ cucumber + ½ cup parsley + ½ cup spinach
Tomato-spinach-parsley	½ Cup of parsley, ½ cup of spinach, 4 tomatoes.
Parsley-spinach-carrots	Squeeze a cup of parsley, cup of spinach, 4 carrots.
Sweet potatoes-carrot-beet	1 Beet + ½ sweet potato + 3 carrots. A diet of this juice made before a holiday in a sunny location protects the skin from sunburn
Apples-carrots-broccoli-cabbage	2 Carrots + 2 apples + 1 cup of broccoli + ½ cabbage. It is a very useful juice for detoxification.
Apple-carrot-celery-lemon-cucumber	1 Apple + 4 carrots + 1 celery stalk + ½ lemon + ¼ cucumber
Apples-carrots-broccoli, parsley-lemon	½ Cup broccoli + 1 apple + 3 carrots + one handful of parsley + ½ lemon
Carrots-apple-celery-potato-lemon	2 carrots + 1 apple + 1 celery stalk + 1 small potato + half lemon. Potato juice, though unpleasant to taste, is very useful in treating many digestive disorders (gastritis, colitis, irritable bowel).
Celery-cucumber-spinach-apple-lemon-ginger	4 Berries + 1 cucumber + 2 apples + 1 spinach + ½ lemon + 2 slices of ginger.
Apples-carrots-celery-cucumber-spinach	½ Apple + 3 carrots + 2 celery stems + ½ cucumber + 1 cup spinach.
Apple-carrot-celery-cucumber-mint-parsley-lemon-ginger	1 Apple + 1 carrot + 1 celery stalk + 1 cucumber + ½ lemon + ¼ mint cup + ¼ cup parsley + 2 cm ginger.

11.4 Concluding Remarks

11.4.1 Fruit-Based Beverages

Among the healthiest fruit juices that can be prepared from fresh raw material is the one prepared from, grapes, redberry, and green apples. All these ingredients contain biologically active compounds that are excellent for the health of the blood cells and muscle function. It also gives the daily dose required for vitamin K—very important for blood and bone health.

For a healthy skin, a beverage prepared from soothing and moisturizing ingredients, rich in vitamins A, B, C, and E, may be prepared from a mix of pear and cherry juice.

Another beverage considered among the healthiest recipe, being the supreme antioxidant, is juice from blueberries, strawberries, and mangoes. It will supply the maximum energy needs especially for people who are on losing weight diet.

Pomegranate juice is also one of the healthiest ingredients for fruit beverages, known worldwide as being very beneficial to the heart in treating cancer or inflammation. A glass of fresh pomegranate juice is what you need to help to maintain the health of the cells.

Eventually, the fresh beverage obtained from fruits that will help to improve the health status in case of colds and help to boost immunity in the cold season, will be prepared from vitamin C-rich fruits, such as grapefruit, orange, and kiwi juice. Full in vitamin C, these combined fruits are excellent for fighting flu.

11.4.2 Vegetables-Based Beverages

Fruit juices are excellent in combination with fresh vegetables. Among the healthiest fruit and vegetable juices are pineapple juice, carrots, oranges, spinach, red cabbage, and lemon juice. Good antioxidant and very effective in diets, this juice gives you the energy and daily work power.

Celery juice, carrots, cucumbers, and apples are also the best choice of ingredients for a fresh and natural beverage. It provides the human body a good functioning through the detoxifying effect. Another interesting combination would be a mix of banana, kiwi, pineapple, carrot, and red beetroot. The resulting beverage protects the liver and is a rich source of natural nitrates that ensures good blood circulation to the brain, heart, and muscle.

Wheat germs may be added to all these beverages. It seems that 30 mL of wheat germ juice is equivalent to eating 1 kg of fresh vegetables.

It was already demonstrated that fruit juices or vegetable juices are true natural medicines, and their effect can be enhanced by combining the main ingredients. The daily consumption of fruit and vegetable juices at every meal is a recommendation to be considered by all those who want to have as few health problems as possible. Beverages prepared from fresh fruits and/or vegetables, in the form of simple juices or smoothies, have the role of protecting the body from diseases, but also of improving certain uncomfortable health disorders.

It has been found that the curative effects of the various natural ingredients can be combined into a single drink, thus obtaining both a special taste and a greater range of beneficial effects.

Nowadays, the smoothies are frequently consumed beverages, and are usually prepared from a mix of ingredients that will boost the energetic value. Most of the consumers choose the smoothies consumption for the perceived health benefits. However, care should be taken, to avoid extreme behavior, such as excess energy intakes, and to keep a balanced intake of nutrients, including proteins originating from dairy products and animal origin products (such as meat, eggs, etc.).

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