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THE BENEFITS OF USING NATURAL SWEETENERS IN SPECIAL NUTRITION. A MINI REVIEW

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Abstract: *Currently, with the continuous improvement of living standards, people are paying more and more attention to nutrition and body's health. The daily caloric intake represented by sugar should not exceed 10%, and a reduction in this percentage decreases the risks of health problems, such as diabetes and cardiovascular disease. However, it is the sweet taste that we like and attracts us, so it is necessary to find alternatives to refined sugar. The safest and most effective natural sweeteners that can successfully replace sugar are: stevia, honey, and maple syrup. Stevia is the only natural non-caloric sweetener, has a sweetness 50 to 350 times higher than sugar, and can be used in any diet due to its caloric index of 0 value and its high carbohydrate content. It does not influence blood sugar levels, which indicates that stevia is the safest sweetener. Honey is another natural sweetener that can successfully replace sugar and, at the same time, provide health benefits. Due to the composition of honey, it has an antioxidant, hepatoprotective, cardioprotective, antibacterial, and anti-inflammatory effect, the fructose in honey helps lower blood sugar in diabetes patients, but it should be consumed in moderation. Another natural sweetener that can be used as a sugar substitute in the diabetic diet is maple syrup, with a high content of abscisic acid phytohormone with antidiabetic properties. Taking into account the requirements of consumers to lead a diet as healthy as possible, food industry has tried to find the best ways to adapt so researchers have shown a great interest in adapting the reformulation of foods, beverages and sweets by replacing sugar with natural sweeteners, which can have a low glycemic index, low calorie content but, most importantly, provides a wealth of nutrients.*

Keywords: *glycemic index, honey, maple syrup, stevia.*

1. Introduction

Recent studies show that in recent years, the exaggerated consumption of sugar, especially sucrose and glucose-fructose syrups, has shown a rapid increase in the diet of children, but also of adults. In Europe, the consumption of sugar-sweetened beverages is the second most important source of sugar, preceded by sweet foods [1]. In the last fifty years, sugar consumption has tripled worldwide, so that more than 500 calories a day come from added sugar in various foods. This high consumption raises health problems and some of the diseases associated with the consumption of refined sugar are presented (Figure 1) [2]. Sugar consumption has numerous negative health effects, including type II diabetes [3,4]. Therefore, the World Health Organization developed a guide in 2015 recommending reducing sugar consumption quantitatively by 10% of total energy intake among adults and by 5% of total energy intake in children. For this reason, alternative sweeteners are of interest in successfully replacing sugar in order to achieve this goal, without leading to the disappearance of the sweet taste [5]. Sweeteners belong to the class of additives, which added to foods provide the sweet taste and have fewer calories compared to sugar.

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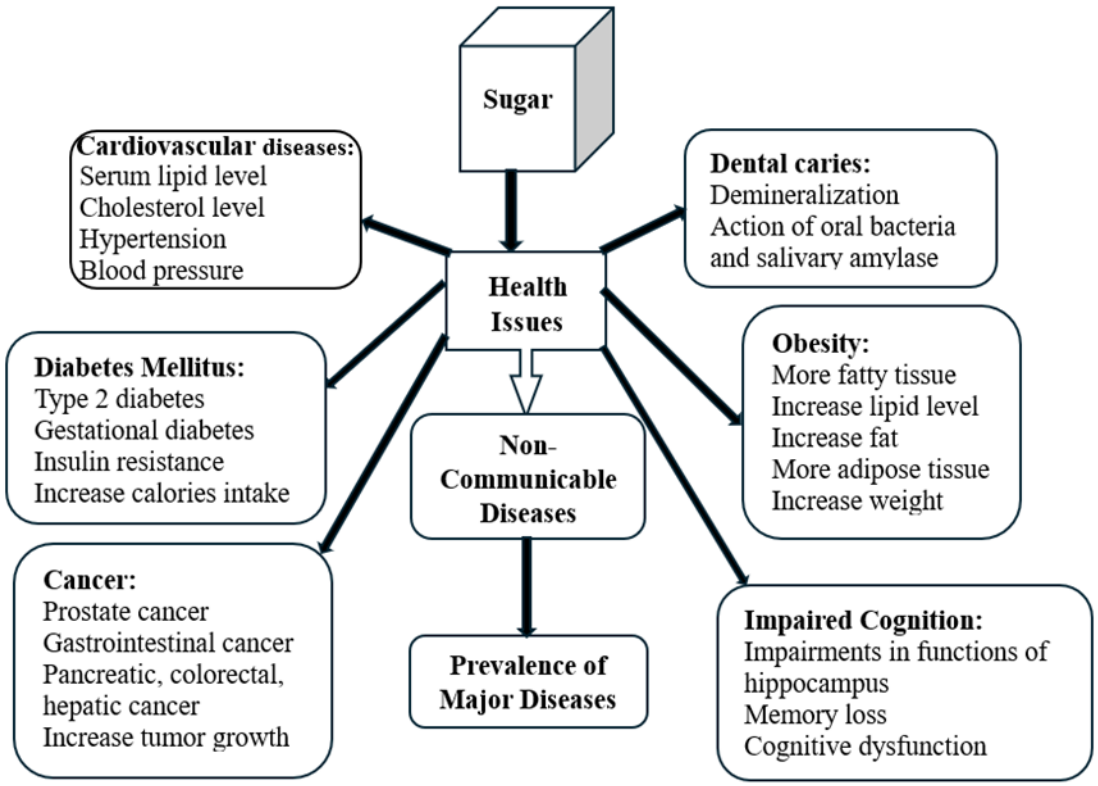

Fig. 1. The impact of sugar consumption on health

In recent decades, foods that have replaced sugar with non-nutritive sweeteners have come to be increasingly in the attention of diabetes patients. Non-nutritive sweeteners provide the sweet taste of food without harming health [6]. They help reduce calorie intake and effectively manage weight and blood sugar levels [4,7]. Diabetes is a significant global health problem, highlighting the critical role of dietary strategies in its management and prevention [8]. Diabetes is one of the most common metabolic diseases caused by insufficient insulin generation, the hormone that helps absorb sugar from the blood, or the insulin created cannot be used in the body, resulting in a long-term metabolic disorder [9]. When a person with diabetes consumes a higher amount of sugar, many parts of the body, implicitly the cells responsible for making insulin will be affected and subsequently, other conditions such as those of the heart, blood vessels, nerves, eyes, and kidneys can occur [8]. A recent study showed that diabetes affects approximately 537 million adults worldwide between the ages of 20 and 79 (10.5% of all adults in this age group), tripling from 2000, when approximately 151 million people suffered from diabetes (4.6% of the world's population at the time). By 2030, 643 million people are projected to have diabetes globally, rising to 783 million in 2045 [10]. Diabetes is widespread worldwide and is considered a risk factor with a negative impact on the health of individuals and society in all age groups. To prevent the risk of increasing the population with diabetes, the American Diabetes Association has found the use of artificial sweeteners as an option. After several studies, it was found that artificial sweeteners can cause glucose intolerance and recommended reducing the consumption of sugary sweetened beverages due to their dangerous link to

diabetes [9]. The aim of this paper is to conduct an analysis of natural sweeteners from a nutritional point of view, population safety, and to examine in detail the relationship between them and diabetes, addressing their potential benefits, but also their disadvantages. Based on recent studies showing that stevia and honey are the most beneficial natural sweeteners, and they can successfully replace the sweet taste for people with diabetes [5]. At the same time, these studies can be valuable to inform the population and provide support in the development of public health strategies that aim to reduce the consumption of sugary drinks/products for an improved diet, both for people suffering from diabetes and for children and adults for a balanced diet.

2. Classification of sweeteners, natural sources, and their applications in food

2.1. Artificial sweeteners

Artificial sweeteners have gained real interest as substitutes for conventional sweeteners, in particular sucrose, glucose, or fructose [11], with the aim of using as little or no sugar intake as possible without disappearing the sweet taste [12]. The most important aspect of sweeteners is the sensation of sweetness, which is measured in relation to sucrose (the reference sugar) [13]. Depending on their nutritional value and sweetening power, sweeteners can be nutritious and intensive (Table 1) [13,14].

Table 1.

Classification of sweeteners according to nutritional value

Type of sweeteners	Category of sweeteners	Name
Nutritional sweeteners	Starch Derivat	Glucose
		Isoglucose
	Sucrose Derivat	Inverted sugars
	Polyols	Sorbitol (E420)
		Mannitol (E421)
		Xylitol (E967)
	New sugars	Fructooligosaccharides
Intensive sweeteners	Synthetic sweeteners	Aspartame (E951)
		Acesulfame K (E950)
		Saccharin (E954)
		Dulcin
	Natural sweeteners	Thaumatine (E957)
		Steviol glycosides (E960)
		Monelin
		Neohesperidin dihydrochalcone (E959)
		Glycilizine

In the group of nutritional sweeteners there are simple sugars but also corn syrup rich in fructose, isomaltulose, trehalose, which, according to Regulation (EU) no. 1333/2008 are considered ingredients. Intensive sweeteners have a low caloric intake and high sweetening capacity, being used in small quantities in food. In general, they are not cariogenic and do not trigger a glycemic response, they are widely used in diabetic diets or other diets where the glycemic index must be controlled [13,14].

The classification divides sweeteners according to their nature or origin, which can be synthetic or natural (Table 2). Sucrose, a disaccharide, the most widely used table sugar, and the most widely used sweetening agent in the world. Sugar generates dental caries, increases glycemic values in a very short time, has a contribution in cardiovascular diseases, but also in numerous metabolic diseases [13-15]. Polyols, polyhydroxyl alcohols or polyalcohols are food additives that can be

found in nature, especially in fruits and vegetables, being partly responsible for their sweetness. The most commonly used polyols are sorbitol (E420), mannitol (E421), isomaltose (E953), maltitol (E965), lactitol (E966), xylitol (E967), erythritol (968) [5,14,15].

Table 2.

Classification of sweeteners by origin and source of production

Type of sweeteners	Origin of sweeteners	Category of sweeteners	Name
Natural sweeteners	Glycosidic sweeteners	Monosaccharides	Glucose
			Fructose
			Galactose
		Disaccharides	Sucrose
			Lactose
			Maltose
		Polyols first generation	Sorbitol (E420)
			Mannitol (E421)
			Xylitol (E967)
	Nonglycozidic	Polyols second generation	Maltitol (E965)
			Lactitol (E966)
			Izomaltitol (E953)
		Nitrogen derivatives	Taumarin (E957)
			Aspartame (E951)
		Flavonoid derivatives	Neohesperidin dihydrochalcone (E959)
Artificial sweeteners	Saccharin (E954)		
	Cyclamate (E 952)		
	Aspartame (E951)		
	Sucralose (E955)		

Artificial sweeteners are almost entirely obtained during industrial processing from synthetic chemicals, while natural sweeteners are obtained from natural sources (fruits or plants). From this point of view, both types of sweeteners are used for the same uses, but they differ in their distinct nutritional and sensory properties, but also in their different impact on health (Table 3). An increase in sugar intake above 150 kcal per day leads to an eleven-fold increase in the risk of diabetes [13,16,17]. Therefore, the main concern is to replace it with natural sweeteners.

2.2. Natural sweeteners

Natural sweeteners can be:

- nutritives: honey, maple syrup, agave, polyols;
- non-nutritive: steviol glycosides, rebaudiosides, monk fruit, thaumatin [13,16,17].

2.2.1. Honey

Honey is considered one of the most widely used natural sweeteners worldwide. As a chemical composition, honey consists of 60-85% carbohydrates, 12-23% water, proteins, minerals, vitamins, organic acids, amino acids, enzymes and active substances (phenols and flavonoids), which brings benefits both nutritionally and therapeutically. Honey is obtained from honeycombs or apiaries by the extractor method. Water content affects color, crystallization, and viscosity [18-20]. Honey generally inhibits self-fermentation and self-damage. As a uniqueness, honey exhibits antioxidant properties that help delay or prevent food spoilage [20]. Honey consumption prevents the oxidation of human serum lipoproteins and can be used against conditions that cause liver damage and inflammation in the body [21,22].

Table 3.

Synthetic sweeteners versus natural sweeteners

	Artificial sweeteners	**Natural sweeteners**
Cost	Low cost	High cost
Calories	Contain a low number of calories, or have no calories at all	The number of calories is higher and varies
Effects	Negative health effects (diabetes, stomach problems, increased obesity, skin problems created as a result of the allergic reaction)	It has several health benefits, especially for diabetes (reducing the occurrence of chronic diseases, has advantages in cardiovascular and bone diseases)
The basic compounds that give the sweet taste	Amino acids, peptides, and sugar alcohols	Fructose and sugar alcohols
Use	Sprinkling food, sweetening hot drinks, providing a sweet taste and texture to cakes, pastries, sweets, and caramels	Baking bakery products, sweet products, or biscuits, sweetening various beverages, and preserving meat

Honey is a natural energy stimulant, and due to its high caloric content, it is used in the manufacture of confectionery-pastry foods and snacks, cereals, and drinks. Honey can be used in brewing due to its fermentation power of 90-98% and high content of polyphenols that contribute to the taste of beer and improve antioxidant activity [21]. Therefore, replacing sugar with honey as a sweetener in confectionery, snacks, drinks, and ice cream brings benefits to diabetes patients [23]. Diabetes is known to damage the liver and kidneys, leading to liver dysfunction and kidney failure. Taking into account that the glycemic index for diabetes patients is recommended to be no more than 55, and that for honey is between 35-58, replacing sugar with honey helps lower blood glucose levels and reduce complications due to diabetes [22]. Due to the composition of honey, it has antioxidant, hepatoprotective, cardioprotective, antibacterial, and anti-inflammatory effects. The fructose in honey helps lower blood sugar in diabetes patients. Rahim et al. [24] have shown in their study that honey can be used in the ice cream mix as a sugar substitute, flavor, and supplement. The ice cream samples in which honey was used resulted in a good quality product in terms of melting speed and hardness, and in terms of sensory analysis, all samples were accepted by the tasters [24].

2.2.2. Molasses and black molasses

Molasses is obtained from the concentrated juice of sugar cane (70% of cases) or sugar beet (30% of cases) through the process of crystallization of sucrose. The composition of molasses is 17-25% water, 30-40% sucrose, 5-12% fructose, 4-9% glucose, amino acids and vitamins in small percentages, and salt (which can prevent hydrolysis) [21]. Depending on the source and composition, molasses can be plain or black. From a physical point of view, molasses is a viscous liquid, having a brown-black color, with a pleasant smell of freshly roasted coffee and a bittersweet taste.

The composition and quality of molasses differ from factory to factory and even within the same campaign, in relation to:

- the quality of sugar beet or sugar cane;
- the nature of the soil on which sugar beet or sugar cane was grown;
- the quantity and quality of fertilizers applied to the soil;
- meteorological and climatic factors;
- the technological process of sugar extraction;

- the storage conditions of molasses. Molasses can be used in pastries for visual enhancement as a colorant, taking on golden to brown hues to cover unwanted flavors, smelling and tasting like caramel [14]. Molasses also has the property of extending the shelf life of pastries, increasing resistance to infections and inflammatory problems [14,21]. Taking into account that the glycemic index in diabetes patients is recommended to be no more than 55, replacing sugar with molasses helps lower blood glucose levels, which has a low glycemic index, a higher content of polyphenols (about 17 mg/kg) than other natural sweeteners, representing a source of antioxidants. Molasses can be used as a sweetener in dairy products such as yogurts or ice cream [13,21].

2.2.3. Maple syrup

Maple syrup is native to North America, being a natural sweetener from various species of Canadian maples [25]. The antioxidant, antimutagenic and antiproliferative properties against cancer are due to phenolic compounds [21,25]. The color of maple syrup from golden [26], amber, dark and very dark can be influenced by the growing area, phenolic compounds and mineral content [25]. A multi-sample study showed that replacing sucrose with maple syrup in ice cream led to improved chemical properties, such as: decreased total dry matter content, carbohydrates, and pH, while fat concentration did not make a significant difference [26,27]. Physical analysis of ice cream showed a decrease in specific gravity, viscosity, and melt resistance, improving sensory properties [27]. Maple syrup has a high content of abscisic acid phytohormone, responsible for antidiabetic activity [21]. The polyphenol content in maple syrup improves symptoms and reduces complications of diabetes [28]. Maple syrup is used as a spice in bakery products, pastries, in the process of obtaining candies, in the preparation of various snacks and drinks for consumers who practice sports. Due to its antioxidant property and glycemic index 54 (the glycemic index in diabetes patients is recommended to be no more than 55), maple syrup can be successfully used by diabetics to sweeten coffee, giving it a pleasant taste and aroma [21,29].

2.2.4. Coconut sugar

Coconut sugar is obtained from the aqueous sap of the coconut, with organoleptic properties depending on the location and type of soil in which the coconut tree is planted, but also on the climatic conditions. Based on studies, the coconut variety planted in the mountains gives coconut sugar a caramel color, while the same coconut variety planted near the sea gives a darker brown hue. The taste of coconut sugar is similar to that of brown sugar [30]. In the method of obtaining, coconut sugar is subjected to high temperatures, which can lead to impaired physicochemical properties, reducing vitamin C and B3 concentrations, and influencing its color quality, pH and antioxidant activity [31]. Coconut sugar contains 15% sucrose, about 4 kcal per gram, and is rich in carbohydrates [32], amino acids, vitamins, minerals, polyphenols, and antioxidants [33], providing a better digestion rate and a lower glycemic index (between 35 and 42) [21,34]. Coconut sugar is successfully used in the diet of diabetics, mainly in the preparation of sweets and confectionery desserts [29,34].

2.2.5. Agave nectar

Agave nectar or agave syrup is a natural sweetener obtained from the process of hydrolysis of fructans. Nectar is extracted from the agave kernel and is the main reserve of carbohydrates in the form of fructans. The composition of agave nectar consists mostly of fructose, and to a lesser extent of glucose [21], mannitol, inositol and 1-ketosis [35]. The chemical composition includes fructans, bioactive compounds (polyphenols, flavonoids, tannins and saponins), micronutrients (the

minerals: Fe, Ca, K, Mg and Na) and insoluble dietary fiber [35]. It has a much lower glycemic index (between 13 and 17) than other sweeteners and a pH close to 4, making it a very good substitute for sugar in the diet of diabetes patients. Agave nectar is also sweeter than most syrups with high levels of glucose or sucrose (e.g., honey and maple syrups). Therefore, smaller amounts of agave nectar are required to achieve the desired sweetness and translate into a lower caloric intake [36]. Avarina or agave fructans can be used to replace fats. Due to the fiber content, cakes that use agave syrup give the feeling of satiety quickly. Agave syrup has recently gained popularity in the healthy, organic, functional, and diabetic food market. This trend is due to its natural origin and nutraceutical properties [21].

2.2.6. Date syrup

Date syrup is obtained through the process of thermal extraction, this process being responsible for the characteristic dark brown color. Date syrup is rich in carbohydrates (70-80%), dietary fiber (8.7%), amino acids, unsaturated fatty acids (such as oleic, linoleic, palmitoleic and linolenic acids), proteins (1.8%), at least six vitamins including thiamine B1, riboflavin B2, nicotinic acid, A and C [37], salts and minerals (potassium, iron, magnesium and calcium). It has a moisture content of 16% and a total sugar content of 79.5% [21]. Date syrup has numerous health benefits due to its nutritional properties, and its fluoride and selenium content has the property of protecting teeth against cavities and boosts immune function [38]. Date syrup is successfully used in the diabetic diet, with a glycemic index of 47 [29]. Tamman et al., 2014 have conducted studies on date syrup (Dibis) as a potential sugar substitute in ice cream making, taking into account addition proportions of 20, 40, 60 and 100% [38]. The behavior of the following indicators was studied: pH, solids, specific gravity, viscosity, melting speed, but also the sensory evaluation of the finished product. With the increase in the amount of date syrup in ice cream, an increase in titratable acidity has been observed, while the specific gravity decreases compared to that of plain ice cream. The substitution of sugar in ice cream mixes resulted in a significant increase in viscosity, and the increase was proportional to the syrup substitution ratio. In contrast, the melting speed of the resulting ice cream showed a significant decrease compared to the sugar reference sample. Following the study, it is recommended that date syrup can be used as a sugar substitute up to 60% to provide a good quality ice cream, with an increase in the nutritional value of the products [21,38]. Due to its high content of dietary fiber and the bioactive compounds resulting from the fermentation process, date syrup has antioxidant, antidiabetic, cytotoxic and inhibitory properties [39].

2.2.7. Stevia

Stevia is a natural non-caloric sweetener, obtained from the *Stevia rebaudiana* plant, from whose leaves only certain chemical compounds are extracted (the high concentration of steviol glycosides represents about 4-20% of the weight of dried stevia leaves) [21]. It is a shrub native to South America (Paraguay, Brasilia and Argentina), being called "the sweet plant of Paraguay" [40]. This product is processed and purified and is 50 to 350 times sweeter than table sugar [21,41]. Stevia is high in phenolic compounds and flavonoids that act as a good antioxidant. Minerals are in appreciable proportions, such as sodium, potassium, phosphorus, magnesium, iron, manganese, copper, nickel and cobalt. Palmitic acid, linoleic acid, linoleic acid and oleic acid were found in high concentration [42]. Stevia is heat stable, acid-base stable and non-fermentable. For this reason, stevia sweetener is a high-quality medicinal and food resource with no risks to consumers' health [21]. It has attracted scientific and industrial attention for wide applications as

a natural sweetener in food for its nutritional value and a potential alternative to sucrose, having a potential to replace sugar including in ice cream production [43]. The obtaining of stevia is best achieved by the ultrasonic extraction process, producing a yield of 35% stevia [21]. Efficient extraction improves the yield of bioactive components and reduces impurities for further separation and characterization. Nutrient analysis in Stevia leaves showed that they have a total energy of 2.7 kcal/gram, making it a low-calorie sweetener with a high sweetening power [40]. It contains a multitude of different bioactive constituents that are responsible for several activities and sweetness. This sweetness is due to the presence of steviol glycosides, which is 100-300 times sweeter than sucrose. The amount of steviol glycosides in the plant varies depending on climatic, environmental and growing conditions [21]. Its leaves have been used to control and treat diabetes and a variety of other metabolic diseases [8]. Due to these properties, various beverages and food formulas contain stevia, baked goods, and spices. Additionally, stevia ice cream has been suggested for diabetic consumers [21]. Stevia remains stable over a wide range of temperatures, making it suitable for use in ice cream production. It can withstand heat treatment, freezing, and storage without losing its sweetening properties. An ice cream study by Ahmed et al. (2023) showed that when sucrose was replaced by stevia sweetener, the value of solids was reduced, while the protein content increased [44]. Replacing sugar with stevia powder as a sweetener could reduce the caloric value of the product because the number of calories in sucrose is 3.94 kcal/gram while the number of calories in stevia leaf powder is 2.7 kcal/gram [43]. Given the fact that the glycemic index in diabetes patients is recommended to be no more than 55, stevia is successfully used in the diet of diabetics, which has a glycemic index of 0 [29]. The antioxidant activity value of ice cream in which stevia powder has been used, has the ability to counteract free radicals over 50% due to the content of flavonoids and phenols from stevia and antioxidant compounds in fresh milk and skimmed milk [43]. In another studies, *Stevia rebaudiana* was used as a sucrose substitute, polydextrose as a bulking agent, and sorbitol to control the freezing point. It was reported that there were no obvious differences in chemical composition, but there was an increase in acidity. The addition of fat substitute (maltodextrin) and polydextrose and sorbitol lowers the freezing point [45,46]. Stevia consumption increases levels of high-density lipoproteins and vice versa decreases levels of bad cholesterol, lipids, and low concentrations of glycoproteins in the blood [47]. In addition, stevia reduces oxidative stress due to phenolic compounds, decreasing the risk of diabetes [42]. Research has shown that steviol glycosides and steviol can suppress blood glucose levels, making it very beneficial for diabetics. Stevia consumption has blood pressure-lowering, anti-obesity, anti-inflammatory, anti-cancer, tooth decay prevention, and immune-regulating properties [40,47].

3. Benefits and importance of natural sweeteners

High sugar consumption can lead to type II diabetes, obesity, cardiovascular disease and tooth decay. More than ever, consumers are more aware and concerned about sugar intake and are regularly looking for healthier food options, such as natural sweeteners. An overview of current applications is presented, where progress in commercial food manufacturing using natural sweeteners is discussed (Table 4) [21].

Table 4.

Comparison of the nutritional value of natural sweeteners versus refined sugar

Sweetener	Lipids (g/100g)	Carbohydrates (g/100g)	of which sugars (g/100g)	Proteins (g/100g)	Fibres (g/100g)	Sodium (g/100g)	Glycemic index	Nutritional value (kcal/100g)
Honey	0	82.4	82	0.3	0.2	0.012	35-58	286-300
Maple syrup	0.1	67	60.12	0	0	0.0036	54	260-290
Molasses	0.1	74.7	74.7	0	0	0.1	-	290
Coconut sugar	0.38-0.5	92.1-95.01	82-92	1.26-2.6	0	0	35-42	370-388
Agave nectar	0.5	76.4	68	0.1	0.2	0.3	13-17	310
Date syrup	0	93	93	1.4	0.5	0	47	370
Stevia	0	100	0	0	0	0	0	0
Sugar	0	100	100	0	0	0.0003	65-70	387-400
Diabetes glycemic index	≤55							
Studies	[2,21,47-50]							

Consumer demands have led the food industry to make numerous investments in research and development to prepare products based on natural sweeteners, bringing nutritional and health benefits. Natural sweeteners contain a number of bioactive compounds, minerals, fiber, antioxidants, and phytochemicals that help decrease inflammation as well as improve endothelial function (Figure 2). The nutritional properties and antioxidant potential of sugars are influenced by the degree of purification [2]. Natural sweeteners are the best way to replace sugar for a healthy diet. A comparative study was made between natural sweeteners and sugar in terms of nutritional value, macronutrient content and glycemic index to observe the advantages and disadvantages on the diet. Taking into account that the glycemic index in diabetes patients is recommended to be no more than 55, all sweeteners fall within this requirement. Moreover, all natural sweeteners contain essential macronutrients that also provide additional nutritional value and have the potential to protect against certain diseases, including diabetes. They don't just provide empty calories compared to sugar, which is only high in sugar. Thanks to its caloric index of 0 and its high carbohydrate content, stevia is the only natural sweetener that can be used in any diet. In recent years, numerous studies have been carried out on the health benefits of natural sweeteners, especially in the diet of patients with diabetes, a chronic disease of the endocrine system, which remains the leading cause of mortality worldwide [51]. In this context, taking into account the research in the field, it can be summarized the benefits of replacing sugar with natural sweeteners and their importance to the body. It can be seen that all natural sweeteners have beneficial effects on health due to their chemical composition, nutritional value, and long-term behavior. All these sweeteners are a natural source of energy, but they differ in their health benefits. Thus, some are of great importance in the diet of diabetes patients, others in the case of liver, cardiovascular diseases, obesity, nervous system, digestive

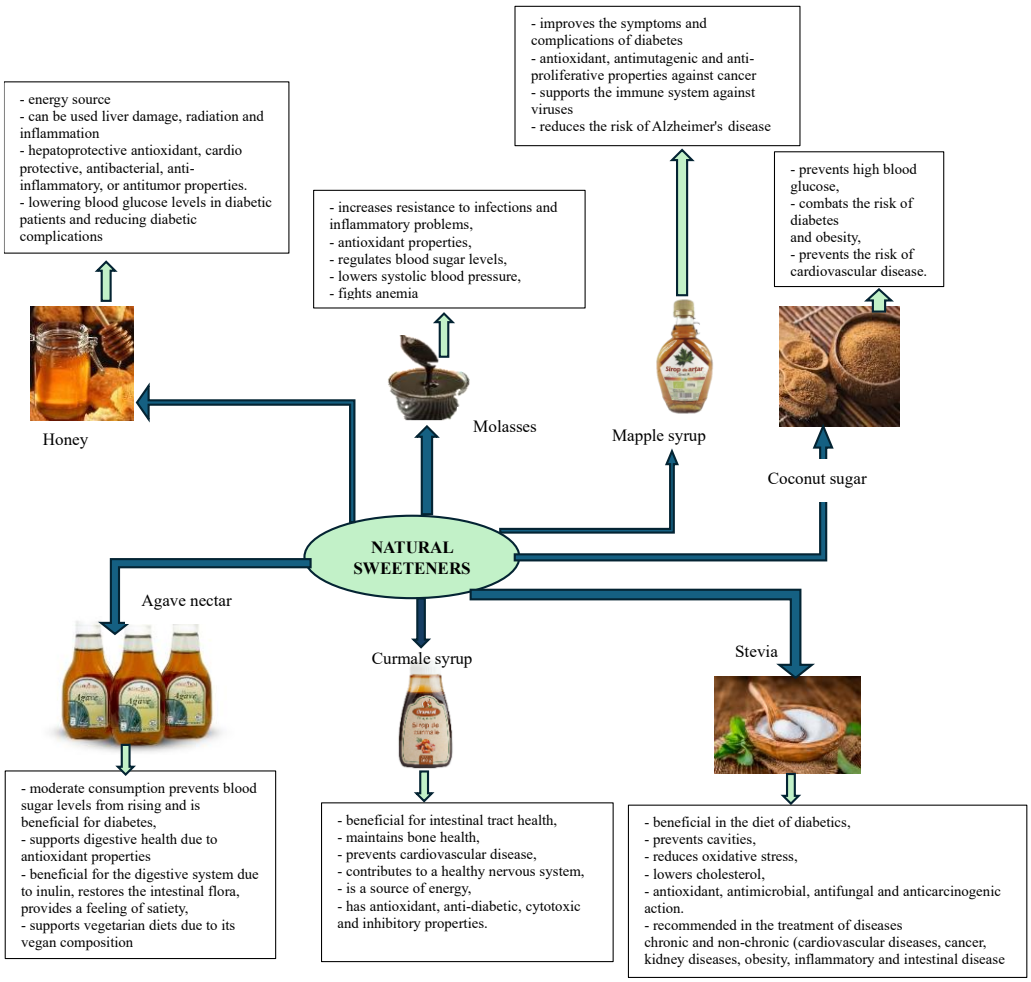

Fig. 2. Benefits and importance of the main natural sweeteners on the body

tract, cancer, or resistance to infections. Comparing natural sweeteners with each other, it can be seen that honey, coconut sugar, date syrup, and stevia are the most important in the case of cardiovascular diseases. In the case of the diet of diabetes patients, the most beneficial sweeteners are stevia, honey, molasses, maple syrup, and agave nectar. Obesity can be prevented by replacing sugar with stevia, date syrup, and coconut sugar. In the case of cancer, maple syrup, date syrup and stevia are the most beneficial natural sweeteners. To prevent liver diseases and dental problems, it is recommended to use honey and stevia, in case of diseases of the intestinal tract and nervous system, the most beneficial are date syrup and stevia. Resistance to infections can be increased with the help of molasses, stevia, and maple syrup; anemia can be fought by drinking molasses, and Alzheimer's disease can be prevented with the help of maple syrup [52]. Since oxidative stress is mainly involved and responsible for the development of diabetes, the antioxidant effects of honey are very important in the management of this disease. A study was conducted to find out how people with type 1 diabetes responded to honey consumption. Twenty patients between the ages of 4 and 18 were enrolled, and for 12 weeks they received honey as part of a nutritional intervention. According to the study, long-term use of honey may have a major influence on the decrease in type 1 diabetes, as it caused

substantial decreases in skin fold thickness, total cholesterol, fasting blood glucose, serum triglycerides, and LDL, as well as an increase in C-peptide [53]. The study done on healthy, diabetic or hypertriglyceridemia patients replacing dextrose and sucrose with honey in their diet showed that honey caused a smaller increase in plasma glucose levels in diabetics. Thus, the lipid profile was improved, normal and elevated C-reactive protein was decreased, and homocysteine and triacylglycerol values decreased in patients with hypertriglyceridemia [54].

4. Conclusions

Most consumers who are trying to reduce their sugar intake but want a little sweetness in their diet are looking for alternative methods, and the most handy are natural sweeteners. There are certainly advantages and disadvantages in each consumer option. some people seek to replace sugar with natural alternatives for better blood sugar control, others consider natural sweeteners to be a healthier alternative with fewer calories. The research in the field presented in this article has shown that replacing sugar with natural sweeteners helps fight obesity, hyperlipidemia, diabetes and cavities. For people who require special nutrition, choosing sweeteners that don't influence blood sugar levels is crucial for maintaining health. These natural sweeteners do not harm human health as sugar does, and instead provide additional health benefits, contribute to a balanced and healthy diet for diabetics, while providing tasty alternatives to refined sugar. Natural sweeteners, especially those with a low glycemic index, do not cause sudden spikes in blood sugar and are gentler on the body. The importance of using natural sweeteners lies not only in the health benefits, but also in the fact that they are less processed or found in their natural state. However, despite all the benefits brought, the use of natural sweeteners also comes with a number of limitations, especially if consumed in excess, including some digestive effects, a bitter or metallic aftertaste or some allergic reactions.

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