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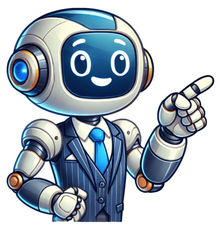

If you have type 2 diabetes or are at high risk for it, you may have heard that honey is better for you than other sweeteners. While honey may have some health benefits, its still a source of simple sugars and carbohydrates. And if you have diabetes, you need to count your carbohydrates throughout the day, especially if youre using medications such as insulin.Heres what you need to know before adding honey to your diet. Honey is a better option that table sugar, but it will still raise your blood sugar, so use it sparingly. Honey is a sweetener made by honeybees and some bumblebees when they gather nectar from flowers. The bees store the nectar in the hive, where it breaks down into simple sugars and turns into honey.Honey is considered an added sugar on Nutritional Facts labels by the FDA because it's not naturally part of foods or drinks. Instead, it's added during processing to sweeten them.Honey is also a source of carbohydrates, which are mainly in the form of simple sugars glucose and fructose. One tablespoon of honey has:61 calories17 grams of sugar17 grams of carbohydrates0.06 grams of protein0.04 grams of fiberIt also contains vitamins and minerals, such as potassium, calcium, zinc, and vitamin C, as well as antioxidants. However, these are not present in significant amounts, so dont look to honey as a major source of these nutrients.Honey is different from white (or table) sugar as it contains vitamins and minerals, whereas sugar lacks these. Honey also has a lower glycemic index (GI) than table sugar. The GI measures how quickly a carbohydrate raises your blood sugar levels. Honey has a GI score of 50, while sugar has a GI value of 80. That means honey (like all carbohydrates) raises blood sugar quickly, but not quite as fast as white sugar.Theres no likely benefit to swapping sugar for honey if you have diabetes since both affect your blood sugar in similar ways. If you do choose to eat honey, make sure you know how much youre getting. Foods containing honey may have more honey and carbohydrates than you realize. That can negatively affect your blood sugar and your ability to take the right amount of insulin.The glycemic index (GI) measures how much foods raise your blood sugar. The higher the GI, the more it affects your blood sugar.Low GI (55 or less): Some fruits, vegetables, beans, grains, pasta, low-fat dairy foods, and nutsModerate GI (56 to 69): White and sweet potatoes, corn, white rice, and couscousHigh GI (70 or higher): White bread, bagels, croissants, cakes, doughnuts, and most crackers and breakfast cerealsCommon SweetenersGlycemic IndexMaltodextrin110Glucose100High fructose corn syrup87Table sugar80Corn syrup75Sucrose65Molasses55Maple syrup54Honey50Sorghum50Lactose45Brown rice syrup25Xylitol12Agave syrup11Mannitol2Stevia< 1In general, it's OK to consume honey when you have diabetes. While honey does have a lower GI than white sugar, it still contains carbs such as fructose and glucose. These carbs are easier for you to digest and have less impact on your blood sugar than white sugar.So, if you use insulin to manage your type 2 diabetes, its very important to track your sugar intake because all types, including honey, will raise your blood glucose. So, talk to your diabetes educator, doctor, or dietitian to figure out how much is safe for you.Experts dont all agree on whether honey is a good choice for people with diabetes. Research shows that honey has anti-inflammatory and antioxidant qualities. That may be important for people with diabetes, who often have higher levels of inflammation in their bodies. But many foods deliver antioxidants without raising your blood sugar. So, you definitely dont need honey to get those nutrients.Much of the research on diabetes and honey has used lab animals, but some studies have been done on people too.A 2022 meta-analysis of 18 small studies found that some types of honey slightly lowered participants' fasting blood sugar. However, a 2021 systemic review of clinical trials found that getting too much honey actually can increase the glucose levels of people with type 2 diabetes. The authors of both reviews say we need more research to know how honey affects people with diabetes.Another small study from Turkish researchers found that people with type 2 diabetes who ate 5-25 grams of honey daily for four months reduced their hemoglobin A1c (HbA1c), which is a measure of blood sugar control over recent months. But those who had higher amounts of honey daily saw their A1c level rise. With only 64 people in the study half of whom got honey doses daily its unclear whether the results would apply broadly.Most published studies on honey and diabetes have had mixed results at best and include small study groups. So, more research is needed to understand if honey has beneficial effects on people with diabetes.There are about 300 different types of honey worldwide, including popular ones such as clover, wildflower, and acacia. They're all sweet but have slightly different flavors and colors based on where the bees source the nectar.Honey is typically available either raw or filtered. Both are about 95% carbohydrates, but regular honey is pasteurized and filtered to remove and kill potential microorganisms that could spoil it. Some filtered honey may also have added sugars.Raw honey, on the other hand, skips these steps and is strained from the hive to the bottle. This preserves many nutrients, such as polyphenols and antioxidants, that are usually killed during pasteurization. It also retains the bee pollen, which processing can remove.Both raw and filtered honey can spike your glucose levels if you have diabetes, but honey still has a lower GI than white sugar. So raw honey, without added sugar, is the best option for people with diabetes.Honey is a natural sweetener that has a lower glycemic index than other sweeteners, such as white sugar. But it can still spike your blood glucose if you have diabetes, so talk to your doctor before you decide to add honey to your diet. For people with diabetes, raw honey is a better option than filtered honey, as it doesn't have added sugars.What are the safest sweeteners for diabetics?Try sweeteners that come from natural sources like monk fruit extract or stevia. Neither are high in calories or sugar, and they both are lower on the glycemic index than table sugar so they're unlikely to cause spikes in blood sugar. They're also less processed than artificial sweeteners, such as Aspartame and Saccharin.Can honey cause diabetes?No. Eating too much honey, or any type of sugar, won't cause diabetes. But it can spike your blood sugar, so you should always eat honey and all sugars in moderation. As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice . 2018 Feb 4;2018:4757893. doi: 10.1155/2018/4757893Diabetes is a metabolic disorder with multifactorial and heterogeneous etiologies. Two types of diabetes are common among humans: type 1 diabetes that occurs when the immune system attacks and destroys insulin and type 2 diabetes, the most common form, that may be caused by several factors, the most important being lifestyle, but also may be determined by different genes. Honey was used in folk medicine for a long time, but the health benefits were explained in the last decades, when the scientific world was concerned in testing and thus explaining the benefits of honey. Different studies demonstrate the hypoglycemic effect of honey, but the mechanism of this effect remains unclear. This review presents the experimental studies completed in the recent years, which support honey as a novel antidiabetic agent that might be of potential significance for the management of diabetes and its complications and also highlights the potential impacts and future perspectives on the use of honey as an antidiabetic agent.Diabetes mellitus is one of the top diseases in modern times, with more than 285 million people estimated in 2010 and about 438 million people predicted for 2030 in all over the world [1]. Diabetes prevalence may be genetically determined or can be developed during lifetime at any age. This disease takes no account of age for example, but scientific studies reveal that it is more common in developing countries than in the rest of the world (developed countries and third world countries) [1]. The increasing incidence may be due to demographic changes and undesirable result of risk factors such as obesity and sedentary life.What is in fact diabetes mellitus? Diabetes is a metabolic disorder with multifactorial and heterogeneous etiologies. The high blood sugar level is the symptom known for diabetes, but other symptoms should not be ignored: increased thirst and hunger, unexplained fatigue, increased urination, blurred vision, and unexpected weight loss. Two types of diabetes are common among humans: type 1 diabetes that occurs when the immune system attacks and destroys insulin. This type of diabetes is believed to be genetically determined but also environmental factors are important in the determination of the disease. The symptoms of this type of diabetes generally start quickly, in a matter of weeks. Type 2 diabetes, the most common form, may be caused by several factors, the most important being lifestyle, but also it may be determined by different genes. This type of disease is developed during several years, and the symptoms are also not noticeable; for this reason, many people find themselves with diabetes without specific or unusual symptoms. Type 2 diabetes is most of the time related to overweight or obese state.Although diabetes mellitus is a chronic disease of endocrine diagnosis and remains the major cause of mortality worldwide [25], it is not a death sentence.Nowadays, the medical world is turning more and more on the health benefits of natural products, medicinal herbs, and also honey, in the management of this illness. Together with classic medical treatment, using recipes of traditional medicine, including the use of apicultural products (i.e., honey), the diabetic patients can maintain the normal level of insulin in the blood and also their overall health condition.Honey composition comprises more than 200 components, with fructose, glucose, and water as main substances. Honey was used in folk medicine back in time at the beginning of our era, but their health benefits were based only on eye observations, without having any basis for scientific support. Only in the last decades, the scientific world was concerned in testing and explaining the benefits of honey. These research studies explain to a large extent many medicinal effects of honey such as antioxidant [611], hepatoprotective [1214], cardioprotective [1517], antibacterial [1823], anti-inflammatory [2426], or antitumor [2730].For a long time, there has been a myth that honey could not be used in diabetic patient's diet, due to the high content of carbohydrates from its chemical composition. Considering the background of the research team that has been working on characterization of different types of honey from Romania and worldwide and the determination of its biological properties for a long period, we considered being appropriate to gather in a review, literature studies that may answer the question: is honey a good substitute for sugar in diabetic diet? Are natural simple sugars important in preventing and treating diabetes mellitus?Therefore, the present study acknowledged different scientific studies, demonstrating the use of honey in diabetes mellitus: preclinical and clinical studies, animal model studies, and human studies that demonstrate the potential impact of honey on this complex disease.Fructose content of honey varies from 21 to 43% and the fructose/glucose ratio from 0.4 to 1.6 or even higher [3134]. Although fructose is the sweetest naturally occurring sweetener, it has a glycemic index of 19, compared to glucose which has 100 or sucrose (refined sugar) with 60 [35]. Different studies reveal the hypoglycemic effect of honey, but the mechanism of this effect remains unclear. It was suggested that fructose, selective mineral ions (selenium, zinc, copper, and vanadium), phenolic acids, and flavonoids might have a role in the process [10, 11, 31, 33, 36, 37].There is evidence that fructose tends to lower blood glucose in animal models of diabetes [38, 39]. Mechanisms involved in this process may include reduced rate of intestinal absorption [40], prolongation of gastric emptying time [41, 42], and reduced food intake [43, 44]. Fructose stimulates glucokinase in hepatocytes, which plays an important role in the uptake and storage of glucose as glycogen by the liver. Glucose on the other hand, which is present beside fructose in honey, enhances the absorption of fructose and promotes its hepatic actions through its enhanced delivery to the liver [45, 46].The pancreas is an important organ in diabetes, because it secrets two glucose-regulating hormonesinsulin and glucagonand honey might protect this organ against oxidative stress and damage with its antioxidant molecules, this being another potential mechanism of hypoglycemic effect of honey [32, 47].Different studies were made on the effect of fructose on glycemic control, glucose-regulating hormones, appetite-regulating hormones, body weight, food intake, and oxidation of carbohydrates or energy expenditure [38, 44, 4861].Fructose administrated alone or as part of sucrose molecule in normal rats improved glucose homeostasis and insulin response compared to rats which received glucose [62]. Other studies show that fructose supplementation in normal or type 2 model of diabetic rats produced lower levels of plasma insulin and glucose, more than other administrated sugars [38].Different animal models were used to study the possible hypoglycemic effect of honey. The most used experimental tool for inducing type 1 and type 2 diabetes is streptozotocin and alloxan of appropriate doses [6366].A study of six weeks [67] on healthy nondiabetic rats fed with a honey-containing diet exhibits good results: weight was reduced statistically significant, but no significant decreasing for glycosylated hemoglobin or food intake was observed.Long-term honey feeding in Sprague-Dawley rats (52 weeks) produces a significant decrease of HbA1c levels but increases HDL cholesterol [68]. In sucrose-fed and sugar-free diet-fed rats, in the same experiment, HDL cholesterol levels were decreased and no other differences were observed for other lipids. Weight gain was similar for honey and sugar-free diet-fed rats but less compared to sucrose-fed rats.Busseroles et al. [69] fed healthy rats with 65g/100g combined fructose and glucose or a honey-based diet for two weeks and the level of blood fructose, serum vitamin E, and serum vitamin E/triglycerides increased, while glucose content remains unchanged and triglyceride content decreased.Feeding healthy rats with a diet containing 20% honey for 33 days, Nemoseck et al. [70] obtained significant decrease of triglycerides, leptin content, body weight, food/energy intake, and epididymal fat weight but not significantly glucose decrease, total cholesterol decrease, adiponectin, and C-reactive proteins. This experiment shows that longer period of feeding must be used, to obtain significant results.Erejuwa et al. [11, 47] found no significant differences in fasting blood glucose or body weight in honey-fed rats.If honey was demonstrated to have hypoglycemic effect in healthy animals, the same beneficial effect was observed in induced diabetic animals. A very important observation regarding honey and diabetes is that honey augments the antihyperglycemic effect of standard antidiabetic drugs in induced diabetes [10, 33].Rabbits with diabetes induced by alloxan were used in one experiment, and three types of sweeteners were used for feeding the animals [65]. Pure honey of Apis florea and Apis dorsata and adulterated honey were given in different doses in a rabbit's diet, and a dose-dependent rise in blood glucose was registered.Another study [66] of alloxan-induced diabetic rats fed with honey and healthy rats fed with fructose shows different results: glucose decreased significantly in alloxan-induced diabetic rats and not significantly in fructose-fed rats. Body weight increased in healthy fructose-fed rats, and hypoglycemic effect and also the same effect were found for streptozotocin-induced diabetic rats [71]. Table 1 summarizes the preclinical studies on healthy and induced diabetic animals, using honey solution or other sweeteners in their diet.Preclinical studies on animal models regarding the effect of honey on induced diabetes mellitus.Ref.Animal modelsApplied treatmentObtained results[10]60 diabetic rats divided into 6 groups: (1) distilled water, (2) honey, (3) glibenclamide, (4) glibenclamide and honey, (5) metformin, and (6) metformin and honeyDistilled water, honey, glibenclamide, glibenclamide and honey, and metformin or metformin and honey treatment orally once a day for 4 weeksHoney significantly increased insulin (0.410.06ng/ml), decreased hyperglycemia (12.33.1mmol/L), and fructosamine (304.510.1mol/L). Glibenclamide and metformin alone significantly reduced hyperglycemia, but combined with honey, produced significantly much lower blood glucose (8.82.9 or 9.93.3mmol/L, resp.) compared to glibenclamide or metformin alone (13.93.4 or 13.22.9mmol/L).[11]Diabetic rats (6 rats/group) induced by streptozotocin (STZ) 60mg/kgDistilled water (0.5ml/day)Honey (0.2g/kg/day, 1.2g/kg/day, and 2.4g/kg/day) oral gavage for 4 weeksTotal antioxidant status (TAS), activities of catalase (CAT), glutathione peroxidase (GPx), glutathione reductase (GR), and glutathione-S-transferase (GST) were significantly reduced, while superoxide dismutase (SOD) activity was upregulated in kidneys of diabetic rats. Lipid peroxidation (TBARS) and fasting plasma glucose (FPG) were significantly elevated while body weight was reduced in diabetic rats. Honey significantly increased body weight, TAS, and activities of CAT, GPx, GR, and GST in diabetic rats.[12]Adult male Sprague-Dawley rats; diabetes induced by STZ (60mg/kg body weight)Tualang honey (1.0g/kg body weight)Tualang honey supplementation in diabetic rats reduces elevated levels of AST and ALT and also produces a hepatoprotective effect in STZ-induced diabetic rats.[14]6 groups of 6 rats/group(1) Control rats feed with standard pellet diet and water; (2) diabetic rats as untreated diabetic control; (3) diabetic rats treated with honey 1.0g/kg BW for 21 days; (4) hyper cholesterol rats: cholesterol (1.5%) and cholic acid (0.5%) mix with diet; (5) hyper cholesterol rats treated with honey (1.0g/kg BW for 21 days); and (6) diabetic rats treated with glibenclamide (0.5mg/kg)Honeybee treatment significantly decreases blood glucose level in diabetic rats. TC, TG, LDL, and VLDL are significantly decreased whereas HDL significantly increases. The SGPT, SGOT, and CRP were significantly decreased.[33]8 groups of diabetic rats (57 animals/group)Treatments/groups: (1) distilled water (0.5ml); (2) honey (1.0g/kg); (3) metformin (100mg/kg); (4) metformin and honey; (5) glibenclamide (0.6mg/kg); (6) glibenclamide and honey; (7) metformin and glibenclamide; and (8) metformin, glibenclamide, and honey orally, once a day for 4 weeksMalondialdehyde (MDA) levels, glutathione peroxidase (GPx), and superoxide dismutase (SOD) activities were significantly elevated while catalase (CAT) activity, total antioxidant status (TAS), reduced glutathione (GSH), and GSH:oxidized glutathione (GSSG) ratio were significantly reduced in the diabetic kidneys. CAT, glutathione reductase (GR), TAS, and GSH remained significantly reduced in the diabetic rats treated with metformin and/or glibenclamide. In contrast, metformin or glibenclamide combined with honey significantly increased CAT, GR, TAS, and GSH.[47]Diabetic (2 groups) and nondiabetic rats (2 groups)Diabetic rats were administered distilled water (0.5ml/d) and Tualang honey (1.0g/kg/d). Nondiabetic rats received also distilled water (0.5ml/d) and Tualang honey (1.0g/kg/d)The honey-treated diabetic rats had significantly reduced blood glucose levels [8.8 (5.8) mmol/L; median (interquartile range)] compared with the diabetic control rats [17.9 (2.6) mmol/L].[65]8 groups of rabbits (6 animals/group); groups I to IV were normal and healthy (nondiabetic) and groups V to VIII were diabetic induced by alloxan monohydrateGroup I: untreated control received 20ml of water orally. Groups IIIV treated orally with 5, 10, and 15mg/kg BW honey diluted up to 20ml/kg with distilled water. Groups VVI treated with tolbutamide (250mg and 500mg). Group V: diabetic control, treated with 20ml of water. Groups VIVIII treated orally with 5, 10, and 15ml/kg BW of honey diluted to 20ml with distilled waterOral administration of pure honeys in 5ml/kg/doses could not produce a significant (P > 0.05) increase in glucose levels in normal and alloxan-diabetic rabbits whereas the adulterated honey significantly raised the blood glucose levels in normal and hyperglycemic rabbits even at this low dosage.[66]48 matured male Wistar rats separated into 6 groupsGroup 1a: control had standard rat chow for 3 weeks. Group 1b: fed with honey along with standard rat chow for 3 weeks. Group 2a: alloxan-induced diabetes and standard rat chow for 3 weeks. Group 2b: alloxan-induced diabetes, fed with honey and standard rat chow. Group 3a: standard rat chow and fructose for 3 weeks. Group 3b: standard rat chow fructose for three weeks than honey along with standard rat chow and fructose for 3 weeksAt the end of three weeks, it was found that daily ingestion of honey for 3 weeks progressively and effectively reduced blood glucose level in rats with alloxan-induced diabetes. Honey also caused a reduction in hyperglycemia induced by long-term ingestion of fructose, albeit to a lesser degree than its effect on alloxan-induced hyperglycemia. Honey could not reduce blood glucose in controlled rats that received neither alloxan treatment nor fructose ingestion, even though it caused an increase in body weight, irrespective of other substances concomitantly administered to the rats.[67]40 six-week-old Sprague-Dawley ratsA powdered diet that was either sugar-free or which contained 8% sucrose, 8% mixed sugars as in honey, or 10% honey freely for 6 weeksHbA1c and triglyceride levels were significantly higher in all sugar treatments compared with rats fed with a sugar-free diet.[68]55 Sprague-Dawley rats aged approximately 8 weeks3 experimental diets were prepared to contain no sugar, 7.9% sucrose, or 10% honeydew honeyWeight gain was substantially reduced in honey-fed rats compared with those given a sucrose-based diet; the finding that consuming honey increases HDL cholesterol levels is still a significant result though. There have been strong associations seen between low HDL cholesterol levels and the increased risk of cardiovascular disease.[71]36 rats divided into 6 groups of 6 animals. Diabetes was induced by STZ (60mg/kg; ip)Diabetic rats received distilled water (0.5ml/day), honey (1.0g/kg/day), and metformin (100mg/kg/day) or a combination of metformin (100mg/kg/day) and honey (1.0g/kg/day) orally for four weeks. Similarly, two groups of nondiabetic rats received distilled water (0.5ml/day) and honey (1.0g/kg/day)Honey significantly increased GSH, TAS, and activities of CAT and GR in diabetic rats while FPG, MDA levels, and SOD activity were decreased.The final results indicate that honey exerts hypoglycemic effect and ameliorates renal oxidative stress.Human diet must have all types of nutrients required in the metabolic transformations and life support. Water, proteins, lipids, carbohydrates, vitamins, minerals, amino acids, and bioactive compounds are needed by the human body, and all of these compounds are taken from the diet. Maintaining a healthy life, equilibrate diet, and intake of each and every one of these nutrients is the key factor of health in general. Different diseases have as a starting point unbalances in metabolism, because of lack or excess of one or more nutrients.Diabetes, as stated before, represents the high level of blood sugars due to low or no insulin production in the body. Experimental studies on animals suggest the beneficial effects of honey as a diet supplement and encouraging results on control of diabetes mellitus and additional complications are presented in medical studies; the experiments and reports on humans (healthy or diabetic) are rather sparse.The published studies present favourable effects of honey in both healthy and diabetic subjects [16, 31, 7276]. Since oxidative stress is implicated and mainly responsible for diabetes development, the antioxidant effects of honey are very important in this disease management [77].The study of Al-Waili [78] on healthy, diabetic, or patients with hypertriglyceridemia shows promising results, when honey was used in their diet, compared with dextrose and sucrose. Thus, lipid profile was improved, normal and elevated C-reactive protein was lowered, and also homocysteine value and triacylglycerol were decreased in patients with hypertriglyceridemia. In diabetic patients, honey compared with dextrose caused a significantly lower rise of plasma glucose level (PGL). Honey caused greater elevation of insulin compared to sucrose; after different time of consumption, it reduces blood lipids, homocysteine, and CRP in normal subjects. The conclusion was that honey compared with dextrose and sucrose caused lower elevation of PGL in diabetics. This experimental study on healthy, diabetic, and hyperlipidemic human subjects demonstrates the different intake rate of refined sugar and honey, the raising of blood sugar and also raising their insulin levels.Sugar is a refined product, obtained from different natural sources, but follows a technological process, leading to an almost pure substancesucrosehighly used in modern life in the food industry.Honey, on the other hand, being also a natural sweet product, has a complex composition, but compared to sugar, it has a lower glycemic index and energetic value. When we talk about refined sugar, it is easy to state the exact chemical composition, very simple actually, but talking about honey, many aspects should be considered regarding its composition. Botanical and geographical origins determine the specific composition and properties of all types of honeys.Table 2 presents comparatively the chemical composition of refined sugar and honey.Average chemical composition of honey compared to sugar.Component/100gHoneySugarGlycemic index5860Calories300Kcal387KcalSugars80.0g99.9gLipids0.02gProtein0.3gCalcium6.0mg1.0mgIron0.42mg0.01mgMagnesium2.0mgPhosphorus4.0mgZinc0.22mgPotassium52.0mg2.0mgVitamin C0.5mgVitamin B20.038mg0.019mgVitamin B30.121mgVitamin B50.068mgVitamin B60.024mgVitamin B92.0gWater17.0g0.03g The fact that refined sugar is almost 100% sucrose, and very small amounts of other components compared to honey, makes the last one, an important sweetener, with almost 80% simple sugars from the total chemical composition (3540% fructose and 3035% glucose).Even though the exact mechanism by which honey may have beneficial effects upon blood glucose is not very clear; from comparative experiments, some conclusions about the importance of fructose in honey are available. Fructose is known to stimulate glucokinase in hepatocytes, which plays an important role in the uptake and storage of glucose as glycogen by the liver [79], the amount of fructose in honey being very important for its hypoglycemic effects.A study on humans [80] evaluated for a large period of time wherein a group of twenty adult patients with type 2 diabetes volunteered to stop their medication and use honey as treatment for their disease. This nonrandomized, open clinical trial aiming to study the safety and efficiency of honey as unique treatment revealed interesting results (Table 3).Clinical studies regarding the effect of honey in human diabetic subjects.RefResearch groupsHoney/sugars treatment schemesObtained results[16]17 subjects (control group)38 subjects (experimental group)70g sucrose daily for 30 days in the control group and 70g of honey in the experimental groupHoney caused a mild reduction in body weight (1.3%) and body fat (1.1%), reduced total cholesterol (3%), LDL-C (5.8), triacylglycerol (11%), FBG (4.2%), and CRP (3.2%), and increase HDL-C (3.3%) in normal subject and in patients honey cause reduction in total cholesterol by 3.3%, LDL-C by 4.3%, triacylglycerol by 19%, and CRP by 3.3%.[31]48 type II diabetic patients:Honey groupControl group1g/kg BW/day for 2 weeks; 1.5g/kg BW/day for next 2 weeks; 2g/kg BW/day for next 2 weeks; and 2.5g/kg BW/day for the last 2 weeksBody weight, total cholesterol, low-density lipoprotein cholesterol, and triglyceride decreased, and high-density lipoprotein cholesterol increased significantly in the honey group. The levels of hemoglobin A (1C) increased significantly in the honey group.[36]24 healthy subjects, 16 type II diabetic subjects6 patients with hypertension12 healthy subjects receive inhalation with distilled water for 10min; after one week, they received inhalation of honey solution (60% wt/v) for 10min. 12 healthy subjects received inhalation of 10% dextrose for 10minHoney inhalation significantly reduced random blood glucose level from 199+/40.9mg/dl to 156+/52.3mg/dl after 30min. Fasting blood glucose level was reduced after honey inhalation during 3hr postinhalation, which was significant at hour 3. Intensity of hyperglycemia was significantly lowered in glucose tolerance test when patients received honey inhalation.[54]32 type II (noninsulin-dependent) diabetic patientsDiet of 25g glucose, fructose, or lactose or 30g honey, 50g white bread, 125g white rice or potatoes, and 150g apples or 260g carrotsBlood glucose and plasma insulin were measured at zero time and then at 15, 30, 60, 90, and 120min after the meal. Counting the blood glucose increase after glucose as 100%, the corresponding increases in glycemia for other carbohydrates were fructose, 81.3%; lactose, 68.6%; apples, 46.9%; potatoes, 41.4%; bread, 36.3%; rice, 33.8%; honey, 32.4%; and carrots, 16.1%.[73]20 young type I diabetic patients in the experimental group; 10 healthy nondiabetics in the control groupCalculated amount of glucose, sucrose, and honey (amount=weight of the subject in kg1.75 with a maximum of 75g/patient)Honey, compared to sucrose, had lower GI and PII in both patients and control groups. In the patient group, the increase in the level of C-peptide after using honey was not significant when compared with glucose or sucrose.[76]30 individuals with a proven parental (mother or father) history of type II diabetes mellitusGlucose diet supplementationHoney diet supplementationThe plasma glucose levels in response to honey peaked at 3060 minutes and showed a rapid decline as compared to that of glucose. Significantly, the high degree of tolerance to honey was recorded in subjects with diabetes as well, indicating a lower glycemic index of honey.[78]48 subjects: healthy and diabetic and with hyperlipidemia(i) Dextrose solution (250ml of water containing 75g of dextrose) or honey solution (250ml of water containing 75g of natural honey)(ii) Dextrose, honey, or artificial honey (250ml of water containing 35g of dextrose and 40g of fructose)(iii) Honey solution, administered for 15 days(iv) Honey or artificial honey(v) 70g of dextrose or 90g of honey in patients with type 2 diabetes mellitus(vi) 30g of sucrose or 30g of honey in diabetic patientsHealthy subjects: dextrose elevated PGL at 1 and 2 hours and decreased PGL after 3 hours. Honey elevated PGL after 1 hour and decreased it after 3 hours. Elevation of insulin and C-peptide was significantly higher after dextrose than after honey. Dextrose slightly reduced cholesterol and low-density lipoprotein cholesterol (LDL-C) after 1 hour and significantly after 2 hours and increased TG after 1, 2, and 3 hours. Artificial honey slightly decreased cholesterol and LDL-C and elevated TG. Honey reduced cholesterol, LDL-C, and TG and slightly elevated high-density lipoprotein cholesterol (HDL-C). Honey consumed for 15 days decreased cholesterol, LDL-C, TG, CRP, homocysteine, and PGL but increased HDL-C.Hypertriglyceridemic patients: artificial honey increased TG, but honey decreased TG. In patients with hyperlipidemia, artificial honey increased LDL-C, while honey decreased LDL-C. Honey decreased cholesterol, LDL-C, and CRP after 15 days.In diabetic patients, honey compared with dextrose caused a significantly lower rise of PGL. Elevation of PGL was greater after honey than after sucrose at 30minutes and was lower after honey than it was after sucrose at different intervals. Honey caused elevation of insulin compared to sucrose after different intervals and lower elevation of PGL in diabetics.[80]20 adult patient volunteers suffering from type 2 DM and its associated metabolic disorders from 30 to 65 years and both sexesHoney dose of 2g/kg BW/day,(i) 50ml (60g) honey was dissolved in water (ratio of 1:3) and given before meals twice daily;(ii) the remaining 25ml (30g) was used for sweetening purposesHoney consumption resulted in more hyperglycemia in these patients but without diabetic ketoacidosis (DKA) or hyperglycemic hyperosmolar state (HHS). Longer-term honey consumption resulted also in weight reduction in all the patients, and control of the blood pressure in the patients, who had hypertension before the honey intervention. The cardiovascular status improved in the patients, who had coronary heart disease (CHD) before the intervention.[88]50 patients with type I diabetes mellitus30 controls without diabetesThe honey dose: 1.75g/kg BWSucrose dose: 1.75g sugar/kg BWThe GI and PII of either sucrose or honey did not differ significantly between patients and controls. Both the GI and PII of honey were significantly lower when compared with sucrose in patients and controls. In both patients with diabetes and controls, the increase in the level of C-peptide after the honey was significant when compared with either glucose or sucrose.Besides glycemic index (GI), peak incremental index (PII) is used to assess the glycemic effect (the effect on blood glucose level after ingestion of various foods) [81].C-peptide is considered a good marker of insulin secretion, being cosecreted with insulin by the pancreatic cells as a by-product, with no biological activity of its own [82], of the enzymatic cleavage of proinsulin to insulin. Scientific studies regarding the effects of honey on insulin and C-peptide levels are controversial in healthy and diabetic patients [54, 83, 84].A study made in the National Institute of Diabetes in Cairo, Egypt, on twenty diabetic young patients and ten healthy nondiabetic ones try to elucidate this controversy [73]. Glucose, sucrose, and honey were administrated diluted with 200ml water, according to the patient's weight (amount of sugar/honey=weight of the subject in kg1.75, with a maximum of 75g). The diluted sugars and honey were ingested in the morning by every participant, one week apart for each sugar type, the whole test lasting for three weeks. Blood tests were made before ingestion and after every 30min postprandial of sugars, until 120min (2 hours). Serum C-peptide level and glucose assay were measured for all blood samples.The glycemic index and peak incremental index were lower both in patients and control group, when honey was used compared to glucose and fructose, but the level of C-peptide was different in patients and control group.Honey causes a postprandial rise of plasma C-peptide levels compared to sucrose and glucose in nondiabetic patients, suggesting that honey might have a direct stimulatory effect on the healthy beta cells of the pancreas [73].Although honey has lower GI than sugar (Table 2), an average value for honey is presented [85], according to fructose/glucose ratio, and GI value of different honeys is also different [86].Twenty healthy subjects from Erciyes University, Kayseri, Turkey, were subjected voluntarily to a test of ingesting 50g of pure glucose in 250ml water and an amount of honey that corresponds to 50g glucose (accordingly to the physicochemical analysis of honey used in the test). Capillary blood samples were taken from the finger in the next morning after sugar consumption and again every 15 minutes after second ingestion of sugars in the next day, until 120 minutes. Serum glucose and serum insulin level decreased after 2 hours of honey intake, and C-peptide level increased slightly 2 hours after honey intake. This study demonstrates how different types of honey, having different GI values, influence the parameters usually measured for diabetes control in a different manner [85].Sixty healthy subjects aged 18 to 30 years, enrolled in one experiment in Isfahan University of Medical Science, Iran [87], receive 80g of honey and 80g sucrose dissolved in 250ml water once a day for six weeks. Systolic blood pressure (SBP), diastolic blood pressure (DBP), and fasting blood sugar (FBS) were determined from each participant at the beginning and in the end of the study. No significant change was registered in SBP and DBP in both groups at the beginning and in the end of the study, but FBS registered a significant reduction in the honey group at the end of the study, compared to the sucrose group [87].Different studies mentioned before show that honey consumption reduces body weight but also blood glucose in healthy and diabetic patients compared to sugar intake. A study on type 2 diabetic patients consuming natural honey shows that body weight may be reduced and blood lipids and glucose as well [31]. The study consists of 58 patients with type 2 diabetes, with fasting blood sugar of 110220mg/dl, with same oral hypoglycemic drugs, but no insulin treatment. The experimental group (n = 25) receives natural honey for eight weeks following an experimental scheme, and the control group (n = 23) did not receive honey or other sweeteners. The participants continued their usual diet over the study period. The body weight and fast blood sugar were measured every 2 weeks, and constant decreasing was registered [31]. Scientific studies reviewed by Erejuwa et al. [12, 33] demonstrate that fructose and oligosaccharides from honey contribute to its hypoglycemic effect. In addition to lowering oxidative stress and hyperglycemia, honey consumption ameliorates other metabolic disorders associated with diabetes, such as reduced levels of hepatic transaminases, triglycerides, and glycosylated hemoglobin (HbA1c) and increased HDL cholesterol [12, 31].Several honey types from different parts of the world ameliorate metabolic abnormalities in type 1 and type 2 diabetic patients [36, 73, 88]. These studies investigate the acute effects of honey on hyperglycemia and metabolic disorders, because the diabetic parameters were measured postprandial in studies which last from two to eight weeks. Table 3 summarizes the clinical studies on humans, applied treatment, and the main obtained results.Besides the health benefits of ingesting honey in diabetes, another important use of honey could be in managing diabetic wounds [89]. These wounds are not like typical wounds, they are slower in healing or they do not heal at all, leading to complications that conventional medications do not work.Honey was used in alternative medicine for healing different wounds since ancient times, the use of honey in diabetic wound management being more recent. Diabetic patients sometimes suffer from different complications such as arterial disease, vascular problems, ulcerations, and foot complications [90, 91].Even if diabetic wounds are similar to wounds from normal patients, the healing process in the former is very slow and problematic and the medical costs are extremely high. Honey is a potential candidate to be used in these treatments because it is available, natural, and not expensive. But how can honey work at the wound site? The honey diluted with water or different body fluids forms hydroxyl radicals and hypochlorite anions at the wound site. The antioxidants present in the honey act through two different mechanisms in a wound: first, antioxidants fight against microorganisms and lower the infection in the wound [75, 92, 93]; second, the same antioxidants reduce the reactive oxygen species and inflammation caused by the wound, helping in the healing process [9496].The antimicrobial activity of honey is due to acidic pH, osmotic effect, hydrogen peroxide, and nitric oxide. The presence of nitric oxide metabolites in honey as well as the production of NO products by honey in different body fluids improves the healing process [74, 80, 97].Debridement, wound odor, scar formation, and inflammation control are very important in diabetic wound management [89]. The slow healing process in diabetic wounds is due to the peripheral arterial diseases and peripheral neuropathy that occur with diabetes; the blood vessels tend to shrink, reducing blood circulation in the respective areas. The nerves do not receive enough blood (nutrients) and may become damaged and more vulnerable to injury. The stimulating tissue growth when honey is used is due to the chemical composition, the presence of assimilable sugars, vitamins, amino acids, and phenolics that increases oxygen and nutrients in the wound area [98, 99].Numerous studies show evidence of successful honey treatments against diabetic wounds all over the world [100105]. Honey applications reduce wound ulcer pain and size and deodorization of the wound, and reduction of healing time and are safe and there are no side effects.A recent study [106] brings new evidence in demonstrating the effects of Manuka honey in wound healing. The results reported by the authors, based on the capacity of this type of honey to improve the responsiveness to oxidative damage, as well as stimulation of cell proliferation, could help to understand how Manuka honey develops its healing effect on wounds.Although, some guidelines for honey applications must be used such as natural unheated honey should be used in treatments and stored in dark glass bottles in cool places. Different medical grade honey with standardized antibacterial activity for use in wound treatments are known, such as Apiban (Apimed: Cambridge, New Zealand), Woundcare 18+ (Comvita: Te Puke, New Zealand), and Medihoney (Capilano: Richmonds, Queensland, Australia) [99]. If these honeys are not available, any dark honey with high antibacterial activity may be used.Considerable evidence from experimental studies shows that the honey may provide benefits in the management of diabetes mellitus. The benefits could be a better control of the hyperglycemic state, limiting other metabolic disorders and diminishing the deleterious effects on different organs that may produce diabetic complications. Anyway, there are some data and literature with contrary discussions regarding the use of honey in diabetic diseases.Animal models of diabetes were employed chemically (streptozotocin or alloxan), and this may not entirely reflect the development of type 2 diabetes in humans. More studies on animals are necessary but following other animal models, closer than human type 2 diabetes.Optimal doses for human consumption must be established, and longer period experiments must be developed, due to the fact that diabetes mellitus is a chronic disease.Answering the main question of the study, it is true that honey may be used as a potential antidiabetic agent that has the potential to reduce the complications of diabetes, long-term studies using honey as an alternative or a complementary therapy in human subjects suffering from type 2 diabetes mellitus are needed, with a larger number of patients, randomized clinical trials set up with different levels of diabetes, treated with different doses of honey, following both short-term and long-term treatment.As stated recently [107], The use of honey in diabetic patients still has obstacles and challenges and needs more large sample sized, multicenter clinical controlled studies to reach better conclusions.ALT:Alanine aminotransferaseAST:Aspartate aminotransferaseBW:Body weightCAT:CatalaseCHD:Coronary heart diseaseCRP:C-reactive proteinDBP:Diastolic blood pressureDKA:Diabetic ketoacidosisDM:Diabetes mellitusFBG:Fasting blood glucoseFBS:Fasting blood sugarFPG:Fasting plasma glucoseGI:Glycemic indexGPx:Glutathione peroxidaseGR:Glutathione reductaseGSH:Reduced glutathioneGSSP:Oxidized glutathioneGST:Glutathione-S-transferaseHbA1C:Glycated hemoglobinHDL:High-density lipoproteinsHHS:Hyperglycemic hyperosmolar stateMDA:MalondialdehydeNO:Nitric oxidePII:Peak incremental indexPGL:Plasma glucose levelSBP:Systolic blood pressureSGOT:Serum glutamic oxaloacetic transaminaseSGPT:Serum glutamate pyruvate transaminaseSOD:Superoxide dismutaseSTZ:StreptozotocinTAS:Total antioxidant statusTBARS:Thiobarbituric acid reactive substancesTC:Total cholesterolTG:TriglycerideVLDL:Very low-density lipoprotein.The authors declare that there are no conflicts of interest regarding the publication of this paper.All authors contributed equally to this paper.1.Shaw J. E., Sicree R. A., Zimmet P. Z. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetic Research and Clinical Practice. 2010;87(1):414. doi: 10.1016/j.diabres.2009.10.007. [DOI] [PubMed] [Google Scholar]2.Wei M., Gaskill S. P., Haffner S. M., Stern M. P. Effects of diabetes and level of glycemia on all-cause and cardiovascular mortality: the San Antonio Heart Study. Diabetes Care. 1998;21(7):11671172. doi: 10.2337/diacare.21.7.1167. [DOI] [PubMed] [Google Scholar]3.Barr E. L. M., Zimmet P. Z., Welborn T. A., et al. Risk of cardiovascular and all-cause mortality in individuals with diabetes mellitus, impaired fasting glucose and impaired glucose tolerance. the Australian Diabetes, Obesity and Lifestyle Study. Circulation. 2007;116(2):151157. doi: 10.1161/CIRCULATIONAHA.106.685628. [DOI] [PubMed] [Google Scholar]4.Kokil G. R., Rewatkar P. V., Verma A., Thareja S., Naik S. R. Pharmacology and chemistry of diabetes mellitus and antidiabetic drugs: a critical review. Current Medicinal Chemistry. 2010;17(35):44054423. doi: 10.2174/092986710793361225. [DOI] [PubMed] [Google Scholar]5.Roglic G., Unwin N. Mortality attributable to diabetes: estimates for the year 2010. Diabetic Research and Clinical Practice. 2010;87(1):1519. doi: 10.1016/j.diabres.2009.10.006. [DOI] [PubMed] [Google Scholar]6.Beretta G., Granata P., Ferrero M., Orioli M., Facino R. M. Standardization of antioxidant properties of honey by a combination of spectrophotometric/fluorimetric assays and chemometrics. Analytica Chimica Acta. 2005;533(2):185191. doi: 10.1016/j.aca.2004.11.010. [DOI] [Google Scholar]7.Bertoncelj J., Golob T., Dobersek U., Jamnik M. Evaluation of the phenolic content, antioxidant activity and color of Slovenian honey. Food Chemistry. 2007;105(2):822828. doi: 10.1016/j.foodchem.2007.01.060. [DOI] [Google Scholar]8.Mrghita L. A., Dezmirean D., Moise A., Bobi O., Laslo L., Bogdanov S. Physico-chemical and bioactive properties of different floral origin honeys from Romania. Food Chemistry. 2009;112(4):863867. doi: 10.1016/j.foodchem.2008.06.055. [DOI] [Google Scholar]9.Alvarez-Suarez J. M., Tulipani S., Daz D., et al. Antioxidant and antimicrobial capacity of several monofloral Cuban honeys and their correlation with color, polyphenol content and other chemical compounds. Food and Chemical Toxicology. 2010;48(8-9):24902499. doi: 10.1016/j.fct.2010.06.021. [DOI] [PubMed] [Google Scholar]10.Erejuwa O. O., Sulaiman S. A., Wahab M. S., Sirajudeem K. N. S., Salleh S., Gurtu S. Antioxidant protective effect of glibenclamide and metformin in combination with honey in pancreas of streptozotocin induced diabetic rats. International Journal of Molecular Science. 2010;11(5):20562066. doi: 10.3390/ijms11052056. [DOI] [PMC free article] [PubMed] [Google Scholar]11.Erejuwa O. O., Gurtu S., Sulaiman S. A., Ab Wahab M. S., Sirajudeen K. N., Salleh M. S. Hypoglycemic and antioxidant effects of honey supplementation in streptozotocin-induced diabetic rats. International Journal for Vitamin and Nutrition Research. 2010;80(1):7482. doi: 10.1024/0300-9831/a000008. [DOI] [PubMed] [Google Scholar]12.Erejuwa O. O., Sulaiman S. A., Wahab M. S. Hepatoprotective effect of Tualang honey supplementation in streptozotocin-induced diabetic rats. International Journal of Applied Research and Natural Products. 2012;4:3741. [Google Scholar]13.Galal R. M., Zaki H. F., Seif El-Nasr M. M., Agha A. M. Potential protective effect of honey against paracetamol-induced hepatotoxicity. Archives of Iranian Medicine. 2012;15(11):674680. [PubMed] [Google Scholar]14.Asaduzzaman M., Sohanur Rahman M., Munira S., et al. Effects of honey supplementation on hepatic and cardiovascular disease (CVD) marker in streptozotocin-induced diabetic rats. Journal of Diabetes & Metabolism. 2015;6(9):p. 592. doi: 10.4172/2155-6156.1000592. [DOI] [Google Scholar]15.Rakha M. K., Nabil Z. I., Hussein A. A. Cardioactive and vasoactive effects of natural wild honey against cardiac malperformance induced by hyperadrenergic activity. Journal of Medicinal Food. 2008;11(1):9198. doi: 10.1089/jmf.2006.172. [DOI] [PubMed] [Google Scholar]16.Yaghoobi N., Al-Waili N., Ghayour-Mobarhan M., et al. Natural honey and cardiovascular risk factors; effects on blood glucose, colesterol, triacylglycerole, CRP and body weight compared with sucrose. The Scientific World Journal. 2008;8:463469. doi: 10.1100/tsw.2008.64. [DOI] [PMC free article] [PubMed] [Google Scholar]17.Khalil M. D. I., Tanvir E. M., Afroz R., Sulaiman S. A., Gan S. H. Cardioprotective effects of tualang honey: amelioration of cholesterol and cardiac enzymes levels. BioMed Research International. 2015;2015:8. doi: 10.1155/2015/286051.286051 [DOI] [PMC free article] [PubMed] [Google Scholar]18.Weston R. J. The contribution of catalase and other natural products to the antibacterial activity of honey: a review. Food Chemistry. 2000;71(2):235239. doi: 10.1016/S0308-8146(00)00162-X. [DOI] [Google Scholar]19.Tan H. T., Rahman R. A., Gan S. H. The antibacterial properties of Malaysian Tualang honey against wound and enteric microorganisms in comparison to Manuka honey. BMC Complementary and Alternatively Medicine. 2009;9(1):18. doi: 10.1186/1472-6882-9-34. [DOI] [PMC free article] [PubMed] [Google Scholar]20.Mandal M. D., Mandal S. Honey: its medicinal property and antibacterial activity. Asian Pacific Journal of Tropical Biomedicine. 2011;1(2):154160. doi: 10.1016/S2221-1691(11)60016-6. [DOI] [PMC free article] [PubMed] [Google Scholar]21.Mohapatra D. P., Thakur V., Brar S. K. Antibacterial efficacy of raw and processed honey. Biotechnology Research International. 2011;2011:6. doi: 10.4061/2011/917505.917505 [DOI] [PMC free article] [PubMed] [Google Scholar]22.Hammond E. N., Donkor E. S. Antibacterial effect of Manuka honey on Clostridium difficile. BMC Research Notes. 2013;6(1):p. 188. doi: 10.1186/1756-0500-6-188. [DOI] [PMC free article] [PubMed] [Google Scholar]23.Nishio E. K., Ribeiro J. M., Oliveira A. G., et al. Antibacterial synergic effect of honey from two stingless bees: Scaptotrigona bipunctata Lepeletier, 1836 and S. postica Latreille, 1807. Scientific Reports. 2016;6(1, article 21641) doi: 10.1038/srep21641. [DOI] [PMC free article] [PubMed] [Google Scholar]24.van den Berg A. J. J., van den Worm E., van Ufford H. C. Q., Halkes S. B. A., Hoechstra M. J., Beukelman C. J. An in vitro examination of the antioxidant and anti-inflammatory properties of buckwheat honey. Journal of Wound Care. 2008;17(4):172178. doi: 10.12968/jowc.2008.17.4.28839. [DOI] [PubMed] [Google Scholar]25.Kassim M., Achoui M., Mustafa M. R., Mohd M. A., Yusoff K. M. Ellagic acid, phenolic acids and flavonoids in Malaysian honey extracts demonstrate in vitro anti-inflammatory activity. Nutrition Research. 2010;30(9):650659. doi: 10.1016/j.nutres.2010.08.008. [DOI] [PubMed] [Google Scholar]26.Borsato D. M., Pridente A. S., Doll-Boscardin P. M., et al. Topical anti-inflammatory activity of a monofloral honey of Mimosa scabrella provided by Melipona marginata during winter in southern Brazil. Journal of Medicinal Food. 2014;17(7):817825. doi: 10.1089/jmf.2013.0024. [DOI] [PubMed] [Google Scholar]27.Yaacob N. S., Nengsih A., Norazmi M. N. Tualang honey promotes apoptotic cell death induced by tamoxifen in breast cancer cell lines. Evidence-Based Complementary and Alternatively Medicine. 2013;2013:9. doi: 10.1155/2013/989841.989841 [DOI] [PMC free article] [PubMed] [Google Scholar]28.Alvarez-Suarez J. M., Giampieri F., Battino M. Honey as a source of dietary antioxidants: structures, bioavailability and evidence of protective effects against human chronic diseases. Current Medicinal Chemistry. 2013;20(5):621638. doi: 10.2174/092986713804999358. [DOI] [PubMed] [Google Scholar]29.Bulut H. K., Tfekci F. G. Honey prevents oral mocositis in children undergoing chemotherapy: a quasi-experimental study with a control group. Complementary Therapies in Medicine. 2016;29:132140. doi: 10.1016/j.ctim.2016.09.018. [DOI] [PubMed] [Google Scholar]30.Porcza L. M., Simms C., Chopra M. Honey and cancer: current status and future directions. Diseases. 2016;4(4):126. doi: 10.3390/diseases4040030. [DOI] [PMC free article] [PubMed] [Google Scholar]31.Bahrami M., Ataie-Jafari A., Hosseini S., Foruzanfar M. H., Rahmani M., Pajouhi M. Effects of natural honey consumption in diabetic patients: an 8-week randomized clinical trial. International Journal of Food Science and Nutrition. 2009;60(7):618626. doi: 10.3109/09637480801990389. [DOI] [PubMed] [Google Scholar]32.Deibert P., KOnig D., Kloock B., Groenefeld M., Berg A. Glycaemic and insulinaemic properties of some German honey varieties. European Journal of Clinical Nutrition. 2010;64(7):762764. doi: 10.1038/ejcn.2009.103. [DOI] [PubMed] [Google Scholar]33.Erejuwa O. O., Sulaiman S. A., Wahab M. S., Salam S. K. N., Salleh S., Gurtu S. Comparison of antioxidant effects of honey, glibenclamide, metformin and their combinations in the kidneys of streptozotocin-induced diabetic rats. International Journal of Molecular Sciences. 2011;12(12):829843. doi: 10.3390/ijms12010829. [DOI] [PMC free article] [PubMed] [Google Scholar]34.Mnstedt K., Bohme M., Hauenschild A., Hrgovic I. Consumption of rapeseed honey leads to higher serum fructose levels compared with analogue glucose/fructose solutions. European Journal of Clinical Nutrition. 2011;65(1):7780. doi: 10.1038/ejcn.2010.186. [DOI] [PubMed] [Google Scholar]35.Bantle J. P. Dietary fructose and metabolic sindrome and diabetes. The Journal of Nutrition. 2009;139(6):1263S1268S. doi: 10.3945/jn.108.098020. [DOI] [PMC free article] [PubMed] [Google Scholar]36.Al-Waili N. Intrapulmonary administration of natural honey solution, hyperosmolar dextrose or hypoosmolar distill water to normal individuals and to patients with type 2 diabetes mellitus or hypertension: their effects on blood glucose level, plasma insulin and C-peptide, blood pressure and peaked expiratory flow rate. European Journal of Medical Research. 2003;8(7):295303. [PubMed] [Google Scholar]37.Corts M. E., Vigil P., Montenegro G. The medicinal value of honey: a review on its benefits on human health, with a special focus on its effects on glycemic regulation. Ciencia e Investigacin Agraria. 2011;38(2):303317. doi: 10.4067/S0718-16202011000200015. [DOI] [Google Scholar]38.Kwon S., Kim Y. J., Kim M. K. Effect of fructose or sucrose feeding with different levels on oral glucose tolerance test in normal and type 2 diabetic rats. Nutrition Research and Practice. 2008;2(4):252258. doi: 10.4162/nrp.2008.2.4.252. [DOI] [PMC free article] [PubMed] [Google Scholar]39.Erejuwa O. O., Sulaiman S. A., Wahab M. S. Fructose might contribute to the hypoglycemic effect of honey. Molecules. 2012;17(12):19001915. doi: 10.3390/molecules17021900. [DOI] [PMC free article] [PubMed] [Google Scholar]40.Kellet G. L., Brot-Laroche E., Mace O. J. Sugar absorption in the intestine: the role of GLUT2. Annual Reviews of Nutrition. 2008;28(1):3554. doi: 10.1146/annurev.nutr.28.061807.155518. [DOI] [PubMed] [Google Scholar]41.Moran T. H., McHugh P. R. Distinction among three sugars in their effects on gastric emptying and satiety. American Journal of Physiology Regulatory, Integrative and Comparative Physiology. 1981;241(1):R25R30. doi: 10.1152/ajpregu.1981.241.1.R25. [DOI] [PubMed] [Google Scholar]42.Gregory P. C., McFadyen M., Rayner D. V. Relation between gastric emptying and short-term regulation of food intake in the pig. Physiology & Behaviour. 1989;45(4):677683. doi: 10.1016/0031-9384(89)90278-3. [DOI] [PubMed] [Google Scholar]43.Thibault L. Dietary carbohydrates: effects on self-selection, plasma glucose and insulin and brain indoleaminergic systems in rat. Appetite. 1994;23(3):275286. doi: 10.1006/appe.1994.1059. [DOI] [PubMed] [Google Scholar]44.Meirelles C. J., Oliveira L. A., Jordao A. A., Navarro A. M. Metabolic effects of the ingestion of different fructose sources in rats. Experimental and Clinical Endocrinology & Diabetes. 2011;119(4):218220. doi: 10.1055/s-0031-1275276. [DOI] [PubMed] [Google Scholar]45.Fujisawa T., Riby J., Kretchmer N. Intestinal absorption of fructose in the rat. Gastroenterology. 1991;101(2):360367. doi: 10.1016/0016-5085(91)90012-A. [DOI] [PubMed] [Google Scholar]46.Ushijima K., Riby J. E., Fujisawa T., Kretchmer N. Absorption of fructose by isolated small intestine of rats is via a specific saturable carrier in the absence of glucose and by the disaccharide-related transport system in the presence of glucose. The Journal of Nutrition. 1995;125(8):21562164. doi: 10.1093/jn/125.8.2156. [DOI] [PubMed] [Google Scholar]47.Erejuwa O. O., Sulaiman S. A., Wahab M. S., Sirajudeen K. N. S., Salleh M. S., Gurtu S. Antioxidant protection of Malaysian Tualang honey in pancreas of normal and streptozotocin-induced diabetic rats. Annales dEndocronologie. 2010;71(4):291296. doi: 10.1016/j.ando.2010.03.003. [DOI] [PubMed] [Google Scholar]48.Shiota M., Galassetti P., Igawa K. Inclusion of low amounts of fructose with an intraportal glucose load increases net hepatic glucose uptake in the presence of relative insulin deficiency in dog. American Journal of Physiology Endocrinology and Metabolism. 2005;288(6):E1160E1167. doi: 10.1152/ajpendo.00391.2004. [DOI] [PubMed] [Google Scholar]49.Iburi T., Izumiyama H., Hirata Y. Endocrine glands of pancreas. Nihon Rinsho. 2011;69:9599. [PubMed] [Google Scholar]50.Sievenpiper J. L., de Souza R. J., Mirrahimi A., et al. Effect of fructose on body weight in controlled feefing trials: a systematic review and meta-analysis. Annals of Internal Medicine. 2012;156(4):291304. doi: 10.7326/0003-4819-156-4-201202210-00007. [DOI] [PubMed] [Google Scholar]51.Vaisman N., Niv E., Izkhakov Y. Catalytic amounts of fructose may improve glucose tolerance in subjects with uncontrolled non-insulin-dependent diabetes. Clinical Nutrition. 2006;25(4):617621. doi: 10.1016/j.clnu.2005.11.013. [DOI] [PubMed] [Google Scholar]52.Petersen K. F., Laurent D., Yu C., Cline G. W., Shulman G. I. Stimulating effects of low-dose fructose on insulin-stimulated hepatic glycogen synthesis in humans. Diabetes. 2001;50(6):12631268. doi: 10.2337/diabetes.50.6.1263. [DOI] [PubMed] [Google Scholar]53.Teff K. L., Elliott S. S., Tschop M., et al. Dietary fructose reduces circulating insulin and leptin, attenuates postprandial suppression of ghrelin, and increases triglycerides in women. The Journal of Clinical Endocrinology & Metabolism. 2004;89(6):29632972. doi: 10.1210/jc.2003-031855. [DOI] [PubMed] [Google Scholar]54.Ionescu-Trgovite C., Popa E., Sintu E., Mihalache N., Cheta D., Mincu I. Blood glucose and plasma insulin responses to various carbohydrates in type 2 non-insulin-dependent diabetes. Diabetologia. 1983;24(2):8084. doi: 10.1007/BF00297385. [DOI] [PubMed] [Google Scholar]55.Sunehag A. L., Toffolo G., Campioni M., Bier D. M., Haymond M. W. Short-term high dietary fructose intake had no effects on insulin sensitivity and secretion or glucose and lipid metabolism in healthy, obese adolescents. Journal of Pediatric Endocrinology and Metabolism. 2008;21(3):225235. doi: 10.1515/jpem.2008.21.3.225. [DOI] [PubMed] [Google Scholar]56.Ngo Sock E. T., Le K. A., Ith M., Kreis R., Boesch C., Tappy L. Effects of a short-term overfeeding with fructose or glucose in healthy young males. British Journal of Nutrition. 2009;103(07):939943. doi: 10.1017/S0007114509992819. [DOI] [PubMed] [Google Scholar]57.Bocarsly M. E., Powell E. S., Avena N. M., Hoebel B. G. High-fructose corn syrup causes characteristics of obesity in rats: increased body weight, body fat and triglyceride levels. Pharmacology, Biochemistry and Behavior. 2010;97(1):101106. doi: 10.1016/j.pbb.2010.02.012. [DOI] [PMC free article] [PubMed] [Google Scholar]58.Dolan L. C., Potter S. M., Burdock G. A. Evidence-based review on the effect of normal dietary consumption of fructose on blood lipids and body weight of overweight and obese individuals. Critical Reviews in Food Science and Nutrition. 2010;50(10):889918. doi: 10.1080/10408398.2010.512990. [DOI] [PubMed] [Google Scholar]59.Madero M., Arriaga J. C., Jalal D., et al. The effect of two energy-restricted diets, a low-fructose diet versus a moderate natural fructose diet, on weight loss and metabolic syndrome parameters: a randomized controlled trial. Metabolism Clinical and Experimental. 2011;60(11):15511559. doi: 10.1016/j.metabol.2011.04.001. [DOI] [PubMed] [Google Scholar]60.Malik V. S., Schulze M. B., Hu F. B. Intake of sugar-sweetened beverages and weight gain: a systematic review. The American Journal of Clinical Nutrition. 2006;84(2):274288. doi: 10.1093/ajcn/84.1.274. [DOI] [PMC free article] [PubMed] [Google Scholar]61.Jentjens R. L., Underwood K., Achten J., Currell K., Mann C. H., Jeukendrup A. E. Exogenous carbohydrate oxidation rates are elevated after combined ingestion of glucose and fructose during exercise in the heat. Journal of Applied Physiology. 2006;100(3):807816. doi: 10.1152/japplphysiol.00322.2005. [DOI] [PubMed] [Google Scholar]62.Prieto P. G., Cancelas J., Villanueva-Peacarrillo M. L., Valverde I. Plasma D-glucose, D-fructose and insulin responses after oral administration of D-glucose, D-fructose and sucrose to normal rats. Journal of the American College of Nutrition. 2004;23(5):414419. doi: 10.1080/07315724.2004.10719386. [DOI] [PubMed] [Google Scholar]63.Srinivasan K., Viswanad B., Asrrat L., Kaul C. L., Ramaro P. Combination of high-fat diet-fed and low-dose streptozotocin-treated rat: a model for type 2 diabetes and pharmacological screening. Pharmacological Research. 2005;52(4):313320. doi: 10.1016/j.phrs.2005.05.004. [DOI] [PubMed] [Google Scholar]64.Lenzen S. The mechanisms of alloxan- and streptozotocin-induced diabetes. Diabetologia. 2008;51(2):216226. doi: 10.1007/s00125-007-0886-7. [DOI] [PubMed] [Google Scholar]65.Akhtar M. S., Khan M. S. Glycemic responses to three different types of honeys

given to normal and alloxan-diabetic rabbits. Journal of Pakistan Medical Association. 1989;39(4):107113. [PubMed] [Google Scholar]66.Fasanmade A. A., Alabi O. T. Differential effects of honey on selected variables in alloxan-induced and fructose-induced diabetic rats. African Journal of Biomedical Research. 2008;11(20):191196. [Google Scholar]67.Chepulis L. M. The effect of honey compared to sucrose, mixed sugars and a sugar free diet on weight gain in young rats. Journal of Food Science. 2007;72(3):S224S229. doi: 10.1111/j.1750-3841.2007.00286.x. [DOI] [PubMed] [Google Scholar]68.Chepulis L., Starkey N. The long-term effects of feeding honey compared with sucrose and a sugar-free diet on weight gain, lipid profiles and DEXA measurements in rats. Journal of Food Science. 2008;73(1):H1H7. doi: 10.1111/j.1750-3841.2007.00592.x. [DOI] [PubMed] [Google Scholar]69.Busseroles J., Gueux E., Rock E. Substituting honey for refined carbohydrates protects rats from hypertriglyceridemic and prooxidative effects of fructose. The Journal of Nutrition. 2002;132:33793382. doi: 10.1093/jn/132.11.3379. [DOI] [PubMed] [Google Scholar]70.Nemoseck T. M., Carmody E. G., Furchner-Evanson A. Honey promotes lower weight gain, adiposity, and tryglycerides than sucrose in rats. Nutrition Research. 2011;31(1):5560. doi: 10.1016/j.nutres.2010.11.002. [DOI] [PubMed] [Google Scholar]71.Erejuwa O. O., Sulaiman S. A., Wahab M. S., Sirajudeen K. N. S., Salzihan M. S. Effects of Malaysian Tualang honey supplementation on glycemia, free radical scavenging enzymes and markers of oxidative stress in kidneys of normal and streptozotocin-induced diabetic rats. International Journal of Cardiology. 2009;137, article S45 doi: 10.1016/j.ijcard.2009.09.148. [DOI] [Google Scholar]72.Ahmad A., Azim M. K., Mesaik M. A., Khan R. A. Natural honey modulates physiological glycemic response compared to simulated honey and D-glucose. Journal of Food Science. 2008;73(7):H165H167. doi: 10.1111/j.1750-3841.2008.00887.x. [DOI] [PubMed] [Google Scholar]73.Abdulrahman M., El-Hefnawy M., Hussein R., El-Goud A. A. The glycemic and peak incremental indices of honey, sucrose and glucose in patients with type 1 diabetes mellitus: effects on C-peptide level a pilot study. Acta Diabetologica. 2011;48(2):8994. doi: 10.1007/s00592-009-0167-7. [DOI] [PubMed] [Google Scholar]74.Al-Waili N. S. Identification of nitric oxide metabolites in various honeys: effects of intravenous honey on plasma and urinary nitric oxide metabolites concentration. Journal of Medicinal Food. 2003;6(4):359364. doi: 10.1089/109662003772519921. [DOI] [PubMed] [Google Scholar]75.Al-Waili N. S. Investigating the antimicrobial activity of natural honey and its effects on the pathogenic bacterial infections of surgical wounds and conjunctiva. Journal of Medicinal Food. 2004;7(2):210222. doi: 10.1089/1096620041224139. [DOI] [PubMed] [Google Scholar]76.Agrawal O. P., Pachauri A., Yadav H., et al. Subjects with impaired glucose tolerance exhibit a high degree of tolerance to honey. Journal of Medicinal Food. 2007;10(3):473478. doi: 10.1089/jmf.2006.070. [DOI] [PubMed] [Google Scholar]77.Gheldorf N., Wang X. H., Engeseth N. J. Buckwheat honey increases serum antioxidant capacity in humans. Journal of Agricultural and Food Chemistry. 2003;51(5):15001505. doi: 10.1021/jf025897t. [DOI] [PubMed] [Google Scholar]78.Al-Waili N. S. Natural honey lowers plasma glucose, C-reactive protein, homocysteine, and blood lipids in healthy, diabetic and hyperlipidemic subjects: comparison with dextrose and sucrose. Journal of Medicinal Food. 2004;7(1):100107. doi: 10.1089/109662004322984789. [DOI] [PubMed] [Google Scholar]79.Van Schaftingen E., Vandercammen A. Stimulation of glucose phosphorylation by fructose in isolated rat hepatocytes. The FEBS Journal. 1989;179(1):173177. doi: 10.1111/j.1432-1033.1989.tb14537.x. [DOI] [PubMed] [Google Scholar]80.Abdulrhman M. A. Honey as a sole treatment of type 2 diabetes mellitus. Endocrynology & Metabolic Syndrome. 2016;5(2):p. 232. doi: 10.4172/2161-1017.1000232. [DOI] [Google Scholar]81.Jenkins D. J., Wolever T. M., Taylor R. H., et al. Glycemic index of foods: a physiological basis for carbohydrate exchange. American Journal of Clinical Nutrition. 1981;34(3):362366. doi: 10.1093/ajcn/34.3.362. [DOI] [PubMed] [Google Scholar]82.Ido Y., Vindigni A., Chang K. Prevention of vascular and neural dysfunction in diabetic rats by C-peptide. Science. 1997;277(5325):563566. doi: 10.1126/science.277.5325.563. [DOI] [PubMed] [Google Scholar]83.Elliot S., Keim N., Stern J. Fructose, weight gain and the insulin. The American Journal of Clinical Nutrition. 2002;76:911922. doi: 10.1093/ajcn/76.5.911. [DOI] [PubMed] [Google Scholar]84.Watford M. Small amounts of dietary fructose dramatically increase hepatic glucose uptake through a Novel Mechanism of Glucokinase Activation. Nutrition Reviews. 2002;60(8):253257. doi: 10.1301/002966402320289377. [DOI] [PubMed] [Google Scholar]85.Soylu M., Atayolu T., Inca N., Silici S. Glycemic index values of multifloral Turkish honeys and effect of their consumption on glucose metabolism. Journal of Apicultural Research. 2015;54(3):155162. doi: 10.1080/00218839.2015.1131454. [DOI] [Google Scholar]86.Atkinson F., Powell K., Brandt-Miller J. International tables of glycemic index and glycemic load values: 2008. Diabetes Care. 2008;31(12):22812283. doi: 10.2337/dc08-1239. [DOI] [PMC free article] [PubMed] [Google Scholar]87.Rasad H., Dashtabi A., Khansari M., et al. The effect of honey consumption compared with sucrose on blood pressure and fasting blood glucose in healthy young subjects. Global Journal of Medicine Research and Studies. 2014;1(4):117121. [Google Scholar]88.Abdulrhman M., El Hefnawy M., Ali R., Abdel Hamid I., Abou El-Goud A., Refai D. Effects of honey, sucrose and glucose on blood glucose and C-peptide in patients with type 1 diabetes mellitus. Complementary Theraphy in Clinical Practice. 2013;19(1):1519. doi: 10.1016/j.ctcp.2012.08.002. [DOI] [PubMed] [Google Scholar]89.Alam F., Islam A., Gan S. H., Khalil I. Honey: a potential therapeutic agent for managing diabetic woulds. Evidence-Based Complementary and Alternative Medicine. 2014;2014:16. doi: 10.1155/2014/169130.169130 [DOI] [PMC free article] [PubMed] [Google Scholar]90.Singh N., Armstrong D. G., Lipsky B. A. Preventing foot ulcers in patients with diabetes. JAMA. 2005;293(2):217228. doi: 10.1001/jama.293.2.217. [DOI] [PubMed] [Google Scholar]91.Lavery L. A., Higgins K. R., Lanctot D. R. Preventing diabetic foot ulcer recurrence in high-risk patients: use of temperature monitoring as a self-assessment tool. Diabetes Care. 2007;30(1):1420. doi: 10.2337/dc06-1600. [DOI] [PubMed] [Google Scholar]92.Cooper R. A., Molan P. C., Harding K. G. Antibacterial activity of honey against strains of Staphylococcus aureus from infected wounds. Journal of the Royal Society of Medicine. 1999;92(6):283285. doi: 10.1177/014107689909200604. [DOI] [PMC free article] [PubMed] [Google Scholar]93.Estevinho L., Pereira A. P., Moreira L., Dias L. G., Pereira E. Antioxidant and antimicrobial effects of phenolic compounds extracts of Northeast Portugal honey. Food and Chemical Toxicology. 2008;46(12):37743779. doi: 10.1016/j.fct.2008.09.062. [DOI] [PubMed] [Google Scholar]94.Mathews K. A., Binnington A. G. Wound management using honey. Compendium on Continuing Education for the Practicing Verterinarian. 2002;24(1):5359. [Google Scholar]95.Bansal V., Medhi B., Pandhi P. Honey a remedy rediscovered and its therapeutic utility. Kathmandu University Medical Journal. 2005;3(3):305309. [PubMed] [Google Scholar]96.Phan T. T., Wang L., See P., Grayer R. J., Chan S. Y., Lee S. T. Phenolic compounds of Chromolaena adorata protect cultured skin cells from oxidative damage: implications for cutaneous wound healing. Biological and Pharmaceutical Bulletin. 2001;24(12):13731379. doi: 10.1248/bpb.24.1373. [DOI] [PubMed] [Google Scholar]97.Al-Waili N. S., Saleeb N. Honey increased nitric oxide and product in saliva of healthy volunteers. FASEB Conference; 2003; San Diego. pp. 1115. [Google Scholar]98.Molan P. C. The role of honey in the management of wounds. Journal of Wound Care. 1999;8(8):415418. doi: 10.12968/jowc.1999.8.8.25904. [DOI] [PubMed] [Google Scholar]99.Molan P. C. Re-introducing honey in the management of wounds and ulcers-theory and practice. Ostomy/Wound Management. 2002;48(11):2840. [PubMed] [Google Scholar]100.Kamaratos A. V., Tzirogiannis K. N., Iraklianou S. A., Panoutsopoulos G. I., Kanellos I. E., Melidonis A. I. Manuka honey-impregnated dressings in the treatment of neuropathic diabetic foot ulcers. International Wound Journal. 2014;11(3):259263. doi: 10.1111/j.1742-481X.2012.01082.x. [DOI] [PMC free article] [PubMed] [Google Scholar]101.Shukrimi A., Sulaiman A. R., Halim A. Y., Azril A. A comparative study between honey and povidone iodine as dressing solution for Wagner type II diabetic foot ulcers. Medical Journal of Malaysia. 2008;63(1):4446. [PubMed] [Google Scholar]102.Alzahrami H. A., Bakhotmah B. A., Boukraa L. In vitro susceptibility of diabetic wound bacteria to mixture of honey, Commiphora molmol and Nigella sativa. The Open Nutraceuticals Journal. 2011;4:172175. doi: 10.2174/1876396001104010172. [DOI] [Google Scholar]103.Al Saeed M. Therapeutic efficacy of conventional treatment combined with Manuka honey in the treatment of patients with diabetic foot ulcers: a randomized controlled study. The Egyptian Journal of Hospital Medicine. 2013;53:10641071. doi: 10.12816/0001668. [DOI] [Google Scholar]104.Lotfy M., Badra G., Burham V., Alenzi F. Q. Combined used of honey, bee propolis and myrth in healing a deep, infected wound in a patient with diabetes mellitus. British Journal of Medical Science. 2006;63(4):171173. doi: 10.1080/09674845.2006.11732742. [DOI] [PubMed] [Google Scholar]105.Meo S. A., Al-Asiri S. A., Mahesar A. L., Ansari M. J. Role of honey in modern medicine. Saudi Journal of Biological Sciences. 2017;24(5):975978. doi: 10.1016/j.sjbs.2016.12.010. [DOI] [PMC free article] [PubMed] [Google Scholar]106.Alvarez-Suarez J. M., Giampieri F., Cordero M., et al. Activation of AMPK/Nrf2 signalling by Manuka honey protects human dermal fibroblasts against oxidative damage by improving antioxidant response and mitochondrial function promoting wound healing. Journal of Functional Foods. 2016;25:3849. doi: 10.1016/j.jff.2016.05.008. [DOI] [Google Scholar]107.Meo S. A., Ansari M. J., Sattar K., Ullah C. H., Hajjar W., Alasiri S. Honey and diabetes mellitus: obstacles and challenges road to be repaired. Saudi Journal of Biological Sciences. 2017;24:10381042. doi: 10.1016/j.sjbs.2016.12.020. [DOI] [PMC free article] [PubMed] [Google Scholar] Key Takeaway: Honey raises blood sugar almost as much as regular sugar, making it unsuitable as a diabetes-friendly sweetener replacement. Your doctor just told you to cut sugar from your diet because of diabetes. You might be wondering if honey could be your sweet salvation since it comes from nature and seems healthier than processed white sugar. Hi, Im Abdur, your nutrition coach and today Im going to explain whether diabetics can safely eat honey instead of regular sugar and what this choice means for your blood glucose control. The truth about honey and blood sugar will shock you. Honey has a glycemic index of 61, while table sugar sits at 65. This tiny difference means honey raises your blood sugar almost as quickly as regular sugar does. Your body processes honey into glucose within minutes of eating it. The fructose content in honey might seem like an advantage since fructose has a lower glycemic index. However, honey contains about 38% fructose and 31% glucose, which means you still get a significant blood sugar spike from the glucose portion. Research shows that people with diabetes experience similar blood glucose responses to honey and table sugar when consumed in equal amounts. Fact: One tablespoon of honey contains 17 grams of carbohydrates, nearly the same as table sugar at 16 grams. Honey does contain some nutrients that white sugar lacks completely. Raw honey provides tiny amounts of antioxidants, enzymes, and minerals like potassium and magnesium. These nutrients might offer some health benefits, but the amounts are so small they become meaningless when you consider portion sizes. You would need to eat massive amounts of honey to get any significant nutritional benefit. The processing difference between honey and sugar also matters less than people think. While honey comes straight from bees and sugar goes through industrial processing, your digestive system treats both as simple carbohydrates. Your pancreas must produce insulin to handle the glucose from both sweeteners, creating the same metabolic stress for diabetics. Pro Tip: Focus on total carbohydrate content rather than the source when managing diabetes. The American Diabetes Association recommends limiting all added sugars, including honey. If you choose to eat honey occasionally, portion control becomes critical for blood sugar management. One teaspoon of honey contains about 6 grams of carbohydrates, which you must count toward your daily carb allowance. Most diabetes educators suggest treating honey exactly like any other sugar in your meal planning. The key is timing and pairing honey with protein or fiber to slow absorption. Never eat honey on an empty stomach as this causes the fastest blood sugar spike possible. Your best strategy involves testing your blood glucose before and after eating honey to understand your personal response pattern. Note: Always consult your healthcare provider before making changes to your diabetes management plan. Several sweetener alternatives work better for diabetes management than honey. Stevia provides sweetness without affecting blood glucose levels at all. This natural sweetener comes from the stevia plant and has zero calories and zero carbohydrates. Monk fruit sweetener offers another excellent option with no impact on blood sugar. Sugar alcohols like erythritol and xylitol provide sweetness with minimal blood glucose impact. These alternatives let you enjoy sweet flavors without the metabolic stress that honey creates. The goal should be gradually reducing your overall sweet taste preference rather than finding perfect sugar substitutes. Pro Tip: Start with small amounts of alternative sweeteners to avoid digestive upset while your body adjusts. Honey is not a safe sugar substitute for diabetics because it raises blood glucose almost as much as regular table sugar. Sweet solutions require smart choices, not natural assumptions. I would love to hear about your experiences with different sweeteners and how they affect your blood sugar levels, so please share your thoughts in the comments below. At NutritionCrown, we use quality and credible sources to ensure our content is accurate and trustworthy. Below are the sources referenced in creating this article: Sweeteners like honey and sugar are staples in our diets, but the debate surrounding which is healthier often leaves people confused. With more individuals prioritizing health, understanding the differences between these two options is critical. In this article, well explore the unique properties, nutritional values, and potential health impacts of honey and sugar, helping you make an informed choice. To compare honey and sugar effectively, its essential to understand what they are and how they are produced. Honey is a natural sweetener produced by bees. Bees collect nectar from flowers, which they enzymatically transform and store in hives. The result is the thick, golden liquid we know as honey. Types of Honey: The market offers a variety of honey, including raw, Manuka, and wildflower honey. Each type varies slightly in taste, texture, and nutritional profile. Sugar is a crystalline carbohydrate extracted from sugar cane or sugar beets. It undergoes processing to produce the familiar granules. Forms of Sugar: Sugar comes in many forms, such as white sugar, brown sugar, and raw sugar. While similar in calorie content, their processing methods and flavors differ. Examining the caloric content, glycemic index, and micronutrients can reveal crucial distinctions between honey and sugar. One teaspoon of sugar provides about 16 calories, while honey contains approximately 21 calories per teaspoon. Though honey is higher in calories, its natural sweetness means you often use less, potentially lowering overall intake. The glycemic index measures how quickly a food raises blood sugar levels. Honeys GI: Ranges from 35 to 58, depending on the type. This lower GI means it has a milder impact on blood sugar compared to sugar. Sugars GI: Generally around 65, indicating a more significant blood sugar spike. Honey contains trace amounts of vitamins and minerals such as vitamin C, calcium, and potassium. Sugar, on the other hand, is void of these micronutrients, offering empty calories. Related to Read: Does Honey Contain Caffeine? Both honey and sugar have their benefits and risks, particularly when consumed in excess. Honey offers more than just sweetnessit has potential health-enhancing properties. Antioxidant Properties: Honey contains antioxidants like flavonoids, which combat oxidative stress in the body. Antibacterial Benefits: Raw honey can kill bacteria and promote wound healing, thanks to its natural hydrogen peroxide content. Anti-inflammatory Effects: Regular consumption of honey may reduce inflammation, benefiting those with conditions like arthritis. Potential Allergies: While honey is generally safe, some people may experience allergic reactions to pollen in unprocessed honey. Sugar is primarily valued for its ability to provide quick energy, but it comes with notable health risks. Energy Source: Sugar is a fast-acting carbohydrate, ideal for short bursts of energy. Health Risks: Excessive consumption can lead to weight gain, increased blood sugar, and chronic conditions such as diabetes and heart disease. Both honey and sugar affect blood glucose, but their impact varies significantly. These differences are particularly important for people managing diabetes or insulin resistance. Honey generally has a lower glycemic index (GI) than sugar, meaning it causes a slower and more gradual rise in blood sugar levels. This is because honey contains natural sugars like fructose and glucose, alongside trace nutrients that help moderate absorption. Sugar, on the other hand, primarily consists of sucrose, which the body breaks down into glucose and fructose. Its higher GI causes a more rapid blood sugar spike, which may lead to energy crashes and increased cravings. Honey: While honey may have a gentler effect on blood sugar, it still contains carbohydrates and should be consumed in moderation. Raw or unprocessed honey may offer additional benefits due to its antioxidant content. Sugar: High-sugar diets are linked to insulin resistance, and people with diabetes should minimize their intake to maintain stable blood sugar levels. For those with diabetes, consulting a healthcare provider before incorporating either sweetener into the diet is crucial. Both honey and sugar are versatile sweeteners with unique roles in the kitchen. Their differences can influence taste, texture, and even the science behind your recipes. Honey brings a distinct flavor and texture to dishes. Its natural sweetness and moisture content make it a favorite in many recipes. Common Culinary Uses: Honey is often drizzled on yogurt, used as a salad dressing base, or added to teas and smoothies. Its floral notes can enhance desserts like cakes and pastries. Considerations for Baking and Cooking: Honeys higher moisture content can affect the texture of baked goods. Because it is sweeter than sugar, recipes may require less honey than sugar. It also browns more quickly, making it ideal for glazes but requiring caution in high-temperature cooking. Sugar is a cornerstone of baking, offering structure, sweetness, and balance. Versatility in Recipes: Sugar dissolves easily and blends well, making it a staple in everything from beverages to sauces. Its neutral flavor profile pairs seamlessly with various ingredients. Role in Baking Science: Sugar caramelizes at high heat, giving baked goods their golden color and crispy texture. It also stabilizes whipped ingredients and preserves baked products. Choosing between honey and sugar in cooking often depends on the dish and desired outcome. Related to Read: Does Honey Contain Caffeine? The production of both honey and sugar has environmental and ethical implications. Conscious consumers may want to factor these into their decision-making. Beekeeping, when done sustainably, can have positive impacts on ecosystems by supporting pollination. However, some large-scale honey production methods may harm bees or involve unethical practices. Impact on Ecosystems: Bees are vital for pollinating crops, and ethical beekeeping can help preserve their populations. Sustainability Practices: Look for organic or fair-trade certifications to ensure that honey is produced responsibly. Sugar cultivation has a more significant environmental footprint due to the extensive land and water use required. Environmental Effects: The production of sugar, particularly cane sugar, contributes to deforestation, water scarcity, and soil degradation in many regions. Fair Trade and Ethical Labor Practices: Supporting fair-trade sugar helps ensure that farmers are compensated fairly and work in humane conditions. For environmentally-conscious consumers, local or ethically sourced honey may be a better choice. Related to Read: Does Honey Contain Gluten? A Detailed Guide Both honey and sugar have unique benefits and drawbacks. Honey offers antioxidants and a lower glycemic index, making it a slightly healthier option for many people. Sugar, while versatile and essential in certain recipes, lacks nutritional value and poses health risks when consumed excessively. Ultimately, the choice between honey and sugar depends on your health goals, dietary needs, and values. Moderation is key with either sweetener, and integrating more natural, minimally processed options can support better health outcomes. Honey can be a better option for weight loss because it is sweeter than sugar, meaning you may use less. Additionally, honey has a lower glycemic index, helping prevent rapid spikes and crashes in blood sugar. However, both honey and sugar are calorie-dense and should be consumed in moderation. Diabetics can use honey in small amounts as it has a lower glycemic index than sugar. However, it still contains carbohydrates and can raise blood sugar levels. Its best to consult with a healthcare provider before adding honey to a diabetic diet. Honey contains trace amounts of vitamins, minerals, and antioxidants, while sugar is devoid of these nutrients. However, the nutritional benefits of honey are minimal unless consumed in large amounts, which is not recommended. Sugar is better for baking as it contributes to the structure, texture, and caramelization of baked goods. Honey can be used as a substitute but may require recipe adjustments due to its moisture content and sweetness level. Honey, particularly when sourced locally and ethically, is often more sustainable than sugar. Beekeeping can support ecosystems, whereas sugar cultivation can lead to deforestation and water scarcity. Opt for organic, fair-trade products for the most ethical choice. vs Honey is the healthier and more nutritious choice you should make when it comes to honey vs sugar. Honey is lower in calories and carbs, yet its sweeter. In addition, it contains flavonoids and polyphenols that positively impact our health. In comparison, table sugar is made of sucrose and does not positively impact our health. In high amounts, it is associated with adverse health impacts.We all consume honey and sugar daily. Even if we dont know it directly, we always consume something containing it. When consuming sugary foods, such as sugar and honey, it is important to know how they impact our health.This article compares honey and sugar with an in-depth comparison of their health impacts.When it comes to sugar, its 100% carbs. There are no vitamins, minerals, fats, and proteins.Sugar is made of sucrose.Regarding the nutritional profile of honey, we have a more nutrient-dense food.Honey is lower in calories; there are 304 calories in 100g of honey, whereas sugar contains 386 calories. The main reason is that honey comprises 82g of carbs and 17g of water.Honey isricherin vitamins and minerals, such as vitamin B2 and magnesium. However, their amount isnot so remarkable.In the charts below, you can visualize their distribution. Mineral comparison score is based on the number of minerals by which one or the other food is richer. The "coverage" charts below show how much of the daily needs can be covered by 300 grams of the food. 100 g 300 g 1 serving 1 cube - 2.3g1 serving packet - 2.8g1 tsp - 4.2g1 cup - 200g Magnesium Magnesium Calcium Calcium Potassium Potassium Iron Iron Copper Copper Zinc Zinc Phosphorus Phosphorus Sodium Sodium Manganese Manganese Selenium Selenium 0% 0.3% 0.18% 1.9% 2.3% 0.27% 0% 0.13% 0.52% 3.3% 100 g 300 g 1 tbsp - 21g1 cup - 339g Magnesium Magnesium Calcium Calcium Potassium Potassium Iron Iron Copper Copper Zinc Zinc Phosphorus Phosphorus Sodium Sodium Manganese Manganese Selenium Selenium 1.4% 1.8% 4.6% 16% 12% 6% 1.7% 0.52% 10% 4.4% Vitamin comparison score is based on the number of vitamins by which one or the other food is richer. The "coverage" charts below show how much of the daily needs can be covered by 300 grams of the food. 100 g 300 g 1 serving 1 cube - 2.3g1 serving packet - 2.8g1 tsp - 4.2g1 cup - 200g Vitamin C Vit. C Vitamin A Vit. A Vitamin E Vit. E Vitamin D Vit. D Vitamin B1 Vit. B1 Vitamin B2 Vit. B2 Vitamin B3 Vit. B3 Vitamin B5 Vit. B5 Vitamin B6 Vit. B6 Vitamin B12 Vit. B12 Vitamin K Vit. K Folate Folate Choline Choline 0% 0% 0% 0% 0% 4.4% 0% 0% 0% 0% 0% 0% 0% 100 g 300 g 1 tbsp - 21g1 cup - 339g Vitamin C Vit. C Vitamin A Vit. A Vitamin E Vit. E Vitamin D Vit. D Vitamin B1 Vit. B1 Vitamin B2 Vit. B2 Vitamin B3 Vit. B3 Vitamin B5 Vit. B5 Vitamin B6 Vit. B6 Vitamin B12 Vit. B12 Vitamin K Vit. K Folate Folate Choline Choline 1.7% 0% 0% 0% 0% 8.8% 2.3% 4.1% 5.5% 0% 0% 1.5% 1.2% You can read abouthoney vs brown sugarin this article.Contrary to the more common belief that sugar has a glycemic index of 100. The glycemicindex of sugar is 65.The glycemic index of sugar being 65 is that it only made 50% of glucose, and the other 50% is fructose.In comparison, the glycemic index of honey is 60.For a deep dive into theglycemic index of honey, you can read this article.Honey is sweeter than table sugar. This means consuming less honey and fewer calories for the sweetness needed than sugar.Ideally, the best honey that you should consume is from trusted beekeepers who dont mix sugar with their honey. Its best to get seasonal honey aswell since beekeepers often feed their bees sugary water to produce honey quickly and in higher amounts.So find a trusted beekeeper and get the honey from there.You wont find them on supermarket shelves.Considering sugar and honey in a comparison regarding health impacts. Honey is a healthier option when it comes to that comparison.The reason is that honey is more of a nutritious food that contains micronutrients, enzymes, and other bioactive compounds such as polyphenols and flavonoids that positively impact our health.In diabetic patients, its best if they do not consume excess sugar. In cases of insulin resistance, whatever the source of glucose, if post-prandial, there are frequent spikes for long durations. Diabetic complications will start to appear.In this case, sugar is a major red flag. Consumption of table sugar, especially in higher amounts, is associated with increased risks of diabetes (1).It is important to note that occasionally consuming 1 teaspoon of sugar will not cause diabetes. The dose matters.In comparison, honey can be used as an alternate sugar since it is sweeter. However, its best to reduce overall foods that would cause glucose spikes in diabetes.Overall, some data indicates that the consumption of honey positively affects diabetes. However, its best to keep it in low-moderate amounts (2).Honey contains polyphenols and flavonoids that have antioxidative effects. Sugar doesnt have these properties. Honey is not refined; especially good honey from a trusted beekeeper is ideal (3).Some references indicate that high sugar consumption in parallel with processed food has detrimental effects on our bodies by increasing risks of inflammatory damage (4).Honey has been shown to have cytotoxic effects on cancer cells. This doesnt indicate that you can treat cancer, but having proper nutrition on a lifelong basis can decrease your risks of carcinogenesis (5).Epidemiological studies have found an association with high sugar intake in high frequencies with the development of cancer (6).There are many cases of botulism in pediatric ages. Raw honey shouldn't be given to babies up to 12 months because it can contain botulinum toxin that can cause botulism in babies (7).Honey is derived from pollen, which is highly allergic to most people. However, honey has been shown to positively affect allergic rhinitis symptoms by decreasing its symptoms (8).You can read about brown sugar vs. sugar in this article. Nutrient DV% diff. Fructose 0g 40.94g 51% Carbs 99.98g 82.4g 6% Iron 0.05mg 0.42mg 5% Calories 387kcal 304kcal 4% Copper 0.007mg 0.036mg 3% Manganese 0.004mg 0.08mg 3% Zinc 0.01mg 0.22mg 2% Vitamin B6 0mg 0.024mg 2% Vitamin B3 0mg 0.121mg 1% Vitamin B5 0mg 0.068mg 1% Calcium 1mg 6mg 1% Potassium 2mg 52mg 1% Vitamin C 0mg 0.5mg 1% Folate 0g 2g 1% Fiber 0g 0.2g 1% Phosphorus 0mg 4mg 1% Protein 0g 0.3g 1% Vitamin B2 0.019mg 0.038mg 1% Net carbs 99.98g 82.2g N/A Magnesium 0mg 2mg 0% Sugar 99.8g 82.12g N/A Sodium 1mg 4mg 0% Selenium 0.6g 0.8g 0% Choline 0mg 2.2mg 0% Tryptophan 0.004mg 0% Threonine 0.004mg 0% Isoleucine 0.008mg 0% Leucine 0.01mg 0% Lysine 0.008mg 0% Methionine 0.001mg 0% Phenylalanine 0.011mg 0% Valine 0.009mg 0% Histidine 0.001mg 0% Macronutrient breakdown side-by-side comparison 100% 82% 17% Carbohydrate type breakdown side-by-side comparison 100% 44% 50% 2% 4% Data provided by FoodStruct.com should be considered and used as information only. Please consult your physician before beginning any diet. When it comes to sweetening our food and drinks, we often reach for either honey or sugar. But have you ever stopped to think about how these two options affect your body? Specifically, do you know which one is better for your blood sugar levels? The glycemic index (GI) is a measure of how quickly different foods raise blood sugar levels after consumption. While both honey and sugar are considered simple carbohydrates, they have distinct GI values that impact our health in various ways.In this article, well delve into the world of honey vs sugar and explore their respective glycemic indices. Well examine the science behind why some natural sweeteners like honey may be a better choice for blood sugar management, while others may not be as suitable. By understanding these differences, you can make informed decisions about your diet and choose the best option for your health needs. Understanding Glycemic Index (GI)Lets dive into what Glycemic Index (GI) is and why it matters for your diet, helping you make informed choices between honey and sugar.What is Glycemic Index?The glycemic index (GI) is a crucial concept to grasp when it comes to understanding how different foods affect our blood sugar levels. Essentially, GI measures how quickly foods raises blood sugar levels after consumption. Think of it like a speedometer for your bodys reaction to food.Imagine two identical twins eating the same meal, but one twin eats a slice of white bread while the other has whole wheat bread. The GI of white bread is around 70-80, whereas whole wheat bread typically ranks at around 30-40 on the GI scale. This means that the body will respond more quickly to the white bread, causing blood sugar levels to spike rapidly.Foods are ranked on a scale from 0 to 100, with higher values indicating a more rapid increase in blood sugar. For example, pure glucose is given a GI value of 100 by default, making it the reference point for comparison. On the other hand, foods like whole grains and fruits tend to have lower GI values, signaling that they are digested and absorbed more slowly by the body.Importance of GI in Diet and HealthWhen it comes to managing our diet and health, understanding the glycemic index (GI) is crucial. A high-GI diet has been linked to various health problems, including obesity, insulin resistance, and type 2 diabetes. This is because a diet that consistently spikes blood sugar levels can lead to chronic inflammation, oxidative stress, and other metabolic issues.The GI measures how quickly the carbohydrates in a particular food are converted into glucose and released into the bloodstream. Foods with high GIs cause a rapid spike in blood sugar levels, whereas those with low GIs release glucose more slowly. Consuming too many high-GI foods can disrupt our bodys natural ability to regulate blood sugar levels, leading to insulin resistance and other metabolic problems.To maintain good health, its essential to focus on whole, unprocessed foods that have a lower GI. Incorporating more plant-based meals, fruits, and vegetables into your diet can help you manage your blood sugar levels effectively. For example, opting for brown rice instead of white rice or choosing sweet potatoes over regular potatoes are simple ways to make healthier choices. By being mindful of the GI, you can take control of your diet and reduce your risk of chronic diseases.Glycemic Index of HoneyLets take a closer look at the glycemic index (GI) of honey, which can vary depending on its type and production methods. Different honeys have different GIs, affecting how they affect our blood sugar levels. Natural Occurrence and Composition of HoneyHoney is a natural sweetener that contains a combination of fructose, glucose, and other sugars. Its glycemic index (GI) varies depending on its botanical origin, with some types having a lower GI than others.When we say botanical origin, were referring to the type of flowers from which bees gather nectar to produce honey. For example, Manuka honey comes from the Manuka tree in New Zealand and has been shown to have a relatively low GI, around 35-45. On the other hand, clover honey, which is commonly found in most supermarkets, has a higher GI of around 55-65.The varying levels of fructose and glucose are also responsible for the differences in GI between different types of honey. Some honey varieties contain more fructose than others, making them easier to digest and causing a more gradual increase in blood sugar levels. When shopping for honey with a lower GI, look for labels that specify the botanical origin or have it tested by an independent laboratory. This way, you can choose the type of honey that suits your dietary needs best.Types of Honey and Their GI ValuesWhen it comes to honeys glycemic index (GI), there is often confusion around its value due to differences in types of honey. This variation stems from distinct sugar compositions present in each type of honey.For instance, clover honey has a relatively high GI range of 55-74, making it comparable to granulated sugars GI value. On the other hand, manuka honey boasts an impressively low GI range of 35-54, which is even lower than some fruits! This difference arises from variations in its sucrose and fructose content.Another notable type of honey is buckwheat honey, with a GI value of around 55. Its worth noting that the nectar source used to produce the honey plays a significant role in determining its GI value. Darker honeys like buckwheat tend to have a higher antioxidant profile than lighter-colored honeys.To put this into perspective, consider that honey can be up to three times sweeter than sugar due to its fructose and glucose content. This inherent sweetness means even small amounts of honey can contribute significantly to your daily calorie intake. If youre considering incorporating honey into your diet, remember to consume it in moderation and pair it with nutrient-dense foods for optimal nutritional benefits.Glycemic Index of SugarWhen comparing honey and sugar, understanding their glycemic indexes is crucial. Lets dive into the specific values for each to see which one comes out on top in terms of blood sugar control.Composition and Properties of Table SugarWhen we break down table sugar, also known as sucrose, into its basic components, its made up of exactly 50% glucose and 50% fructose. This molecular makeup is crucial to understanding why sugary foods high in table sugar can cause a rapid spike in blood sugar levels.The reason for this spike lies in the way our body processes the glucose and fructose molecules in sucrose. Since theyre present in equal parts, both glucose and fructose are released into the bloodstream at the same rate, causing an abrupt increase in insulin production. This is particularly problematic for individuals who need to manage their blood sugar levels, as it can lead to energy crashes, mood swings, and even long-term complications like insulin resistance.If youre monitoring your carbohydrate intake or managing a specific diet, be aware of the high-glycemic index value associated with table sugar. To put this into perspective, consuming 1 tablespoon (15g) of table sugar is equivalent to consuming around 15-20 grams of pure glucose an amount that can significantly impact blood sugar levels in just 30 minutes to 1 hour. GI Values of Common SugarsLets take a closer look at other sugars that are commonly used in cooking and baking. Agave nectar, for instance, has a GI value of 15-30, which is lower than honey but still relatively high. This means it can cause a significant spike in blood sugar levels.Maple syrup, on the other hand, has a GI value of around 65, making it slightly higher than agave nectar. While its still lower than table sugar, its essential to note that maple syrup contains more minerals and antioxidants compared to refined sugars. However, these beneficial compounds do not significantly impact its glycemic index.Coconut sugar, another popular alternative sweetener, has a GI value of around 35-45. This is slightly lower than both agave nectar and maple syrup, but still higher than honey. When choosing between these options, its crucial to consider the overall nutritional profile and not just the GI value. For example, coconut sugar contains some fiber and minerals, which may help slow down its digestion and absorption in the body.When using these sugars in cooking or baking, keep in mind that even though they have lower GI values than table sugar, their impact on blood sugar levels can still be significant. Always consume them in moderation as part of a balanced diet.Comparison of Honey and Sugar GI ValuesLets dive into a crucial aspect of honey vs sugar: understanding their glycemic index values, which can greatly impact your body. Well compare the GI values of these two popular sweeteners in this section.Similarities and Differences in GIWhen comparing the GI values of honey and sugar, its essential to understand that both have unique profiles depending on their composition and source. Honey, for instance, is a complex mixture of sugars like fructose, glucose, and sucrose, which can vary in proportion depending on its origin and processing methods.Some types of honey, such as Manuka or Buckwheat honey, have been found to have lower GI values compared to others, like Clover or Acacia honey. This means that while they still contain sugars that can raise blood sugar levels, their effects are less pronounced than those of other types. On the other hand, granulated sugar has a relatively consistent GI value across different sources and processing methods.While both honey and sugar can impact blood sugar levels, understanding their individual GI profiles is crucial for managing dietary choices, particularly for individuals with diabetes or those following low-carb diets. By being aware of these differences, you can make more informed decisions about incorporating these sweeteners into your meals and snacks.Factors Influencing Glycemic Response to Honey and SugarWhen it comes to honey and sugar, their GI values can be influenced by more than just their natural composition. Environmental factors such as processing and storage methods play a significant role in determining the final GI value of these two sweeteners.For instance, the way honey is processed can affect its GI value. Raw, unfiltered honey tends to have a lower GI value compared to refined or ultra-filtered honey. This is because the refining process removes natural enzymes that help slow down the digestion and absorption of glucose. Similarly, sugars GI value can be affected by storage conditions improper storage can lead to moisture absorption, causing sugar crystals to become larger and more easily broken down during digestion. To make informed dietary choices, consider the processing methods used for your honey or sugar. Opt for raw, unfiltered honey and store sugar in a cool, dry place to minimize its GI impact. By being mindful of these environmental factors, you can better understand how they affect the glycemic response of these two sweeteners and make more informed decisions about your diet.Practical Applications for Diabetic ManagementNow that weve explored the glycemic index of honey and sugar, lets dive into how you can apply this knowledge to effectively manage your blood sugar levels. Well discuss real-life scenarios where honey proves a better choice than sugar.Using GI Values in Meal PlanningWhen planning meals as someone managing diabetes, using GI values can be a powerful tool for making informed decisions about what to eat. The first step is to familiarize yourself with the GI scale, which ranks foods on a scale of 0-100 based on their impact on blood sugar levels.To apply GI values in meal planning, start by looking up the GI value of each food item you plan to consume. You can find this information online or through resources provided by your healthcare team. Next, consider the portion size and how it will affect your overall GI intake for the meal. For example, if youre eating a high-GI food like white bread (GI = 70), be mindful of the serving size to minimize its impact on blood sugar levels.Its also essential to balance high-GI foods with low-GI options throughout the day. Aim to include at least two or three low-GI foods per meal to help regulate blood sugar spikes. By incorporating GI values into your meal planning, you can create a balanced diet that helps manage diabetes effectively and supports overall well-being. Remember, every small change counts, so start making informed choices today!Potential Benefits of Honey in Diabetes ManagementResearch has shown that honey may have a lower glycemic impact than sugar, making it an attractive sweetener for individuals with diabetes. This is because honey contains various compounds such as flavonoids and phenolic acids that can slow down the digestion of carbohydrates and thereby reduce their glycemic impact.Studies have indicated that consuming honey instead of refined sugars can lead to a more gradual increase in blood glucose levels, which may be beneficial for people with diabetes who need to manage their blood sugar spikes. Furthermore, honeys unique composition also means it has a lower fructose content compared to high-fructose corn syrup (HFCS) or other sweeteners.If youre considering incorporating honey into your diet as part of your diabetes management plan, start by substituting it for refined sugars in moderation. For example, try using honey instead of sugar to sweeten your morning tea or coffee, and see how your body responds to the change.Conclusion and Future Research DirectionsNow that weve weighed the pros and cons of honey versus sugar, lets take a closer look at what our findings mean for your daily choices.Summary of Key FindingsIn summary, our comparison of honey and sugar glycemic index values reveals some surprising differences between these two popular sweeteners. The glycemic index (GI) is a measure of how quickly the body digests carbohydrates into blood glucose levels. Our research found that honey generally has a lower GI value compared to table sugar, with an average GI score of 55-74 for honey versus 65-79 for sugar.This difference in GI values has significant implications for our dietary choices and health outcomes. For instance, individuals with diabetes or those who are sensitive to blood sugar spikes may prefer to consume honey as a sweetener option. However, its essential to note that the GI value of honey can vary depending on its floral source and processing methods. Additionally, while honey has been touted as a healthier alternative to sugar, it is still high in calories and should be consumed in moderation. To put these findings into practice, consider using honey as a sweetener in place of sugar for baked goods or beverages when possible. However, always check the GI value of the specific honey product you choose to ensure it meets your dietary needs.Implications for Future ResearchAs we conclude our exploration of the glycemic index of honey and sugar, its essential to acknowledge the importance of continued research in this area. The ongoing debate surrounding the relative merits of natural sweeteners versus refined sugars underscores the need for further investigation.Future studies should prioritize examining the long-term effects of consuming different sweeteners on metabolic health, weight management, and overall well-being. It would be beneficial to conduct randomized controlled trials that involve a larger sample size and longer duration to provide more definitive conclusions.Researchers may also want to explore the impact of various processing methods on the glycemic index of honey and sugar. For instance, whether raw or processed honey has different effects on blood glucose levels could yield valuable insights. Additionally, investigating how the combination of different sweeteners influences glycemic responses would add depth to our understanding of this complex topic.Ultimately, continued research in this area will allow us to better inform dietary recommendations and provide individuals with evidence-based guidance for making informed choices about their sweetener consumption. By prioritizing high-quality studies, we can refine our understanding of the effects of different sweeteners on human health.Frequently Asked QuestionsCan I still use honey if I have a high GI value for a specific type of honey?Yes, even though some types of honey may have a higher GI value, the benefits of using natural honey as a sweetener can outweigh this effect. When choosing honey, opt for raw or unfiltered varieties to minimize processing effects.How does the GI value of honey compare to other natural sweeteners like maple syrup or agave nectar?Honey generally has a lower GI value than many natural sweeteners, including maple syrup and agave nectar. However, its essential to note that these sweeteners still contribute calories and carbohydrates to your diet.Can I use honey as a direct substitute for sugar in all recipes?No, when substituting honey for sugar in recipes, consider the flavor profile and liquid content of honey, which can impact the final product. Start with small batches and adjust ratios accordingly to achieve desired results.What are some common mistakes people make when trying to manage their blood sugar levels using honey or other natural sweeteners?Common mistakes include relying solely on GI values without considering individual nutritional needs and health conditions, as well as consuming excessive amounts of honey or other sweeteners. Balance is key for optimal blood sugar management.How can I use the GI value of honey in meal planning to help manage my diabetes?When choosing between foods with different GI values, prioritize those with lower indices, such as whole grains, fruits, and vegetables. Use honeys moderate GI value strategically, like in small amounts added to meals or snacks for flavor. Arshad S, Rehman T, Saif S, et al. Replacement of refined sugar by natural sweeteners: focus on potential health benefits.Heliyon. 2022;8(9):e10711. Published 2022 Sep 20. doi:10.1016/j.heliyon.2022.e10711Bobi O, Dezmirean DS, Moise AR. Honey and diabetes: The importance of natural simple sugars in diet for preventing and treating different type of diabetes.Oxid Med Cell Longev. 2018;2018:4757893. Published 2018 Feb 4. doi:10.1155/2018/4757893Ajibola A, Chamunorwa JP, Erlwanger KH. Nutraceutical values of natural honey and its contribution to human health and wealth.Nutr Metab (Lond). 2012;9:61. Published 2012 Jun 20. doi:10.1186/1743-7075-9-61Ugusman A, Shahrin SAS, Azizan NH, et al. Role of honey in obesity management: A systematic review.Front Nutr. 2022;9:924097. Published 2022 Jun 24. doi:10.3389/fnut.2022.924097Palma-Morales M, Huertas JR, Rodrguez-Prez C. A comprehensive review of the effect of honey on human health.Nutrients. 2023;15(13):3056. Published 2023 Jul 6. doi:10.3390/nu15133056Kardas M, Stakiewicz-Bartecka W, Sotys K, et al. The quality of selected raw and pasteurized honeys based on their sensory profiles and consumer preferences.Front Nutr. 2024;10:1330307. Published 2024 Jan 16. doi:10.3389/fnut.2023.1330307U.S. Department of Agriculture FoodData Central. Honey.U.S. Department of Agriculture FoodData Central. Sugars, granulated.Vlachos D, Malisova S, Lindberg FA, et al. Glycemic Index (GI) or Glycemic Load (GL) and dietary interventions for optimizing postprandial hyperglycemia in patients with T2 diabetes: A review.Nutrients. 2020;12(6):1561. Published 2020 May 27. doi:10.3390/nu12061561Ranneh Y, Akim AM, Hamid HA, et al. Honey and its nutritional and anti-inflammatory value.BMC Complement Med Ther. 2021;21(1):30. Published 2021 Jan 14. doi:10.1186/s12906-020-03170-5Samarghandian S, Farkhondeh T, Samini F. Honey and health: A review of recent clinical research.Pharmacognosy Res. 2017;9(2):121-127. doi:10.4103/0974-8490.204647Ahmed A, Tul-Noor Z, Lee D, et al. Effect of honey on cardiometabolic risk factors: a systematic review and meta-analysis.Nutr Rev. 2023;81(7):758-774. doi:10.1093/nutrit/nuac086Ramli NZ, Chin KY, Zarkasi KA, et al. A review on the protective effects of honey against metabolic syndrome.Nutrients. 2018;10(8):1009. Published 2018 Aug 2. doi:10.3390/nu10081009Minden-Birkenmaier BA, Bowlin GL. Honey-based templates in wound healing and tissue engineering.Bioengineering (Basel). 2018;5(2):46. Published 2018 Jun 14. doi:10.3390/bioengineering5020046Onyesom I. Effect of Nigerian citrus (Citrus sinensis Osbeck) honey on ethanol metabolism.S Afr Med J. 2004;94(12):984-986.Al-Tamimi AM, Petrisko M, Hong MY, et al. Honey does not adversely impact blood lipids of adult men and women: a randomized cross-over trial.Nutr Res. 2020;74:87-95. doi:10.1016/j.nutres.2019.11.012Yan RR, Louie JCY. Sugar guidelines should be evidence-based and contain simple and easily actionable messages.Front Nutr. 2023;10:1227377. Published 2023 Aug 15. doi:10.3389/fnut.2023.1227377U.S. Centers for Disease Control and Prevention. Get the facts: Added sugars.Honey is often considered a healthier alternative to sugar; however, its impact on blood glucose is very similar to that of sugar.Honey and sugar are both simple carbohydrates. The glycemic index (GI) score of honey is slightly less than the GI score of sugar. The GI tells you how quickly different foods raise your blood sugar levels. The downside of the GI is that it only tells you how foods affect blood sugar when eaten alone. It doesnt tell you how foods react in the body when consumed with other foods.Keep reading to learn about the potential health benefits of using honey instead of sugar and how their effects on blood sugar compare.{{mid-cta}}Glycemic Index and Glycemic Load of Raw HoneyRaw honey has a moderate to high glycemic index (GI) and glycemic load (GL) compared to other sweeteners. The GI of raw honey ranges from 32 to 85, depending on the variety and processing. The GI measures how quickly a carbohydrate-containing food raises blood glucose levels, with a high GI showing that the food causes a quick spike in blood sugar levels.The glycemic load (GL) considers the GI and the amount of carbohydrates in a food. Raw honey has a high GL because it contains a significant amount of carbohydrates per serving, even though its GI is moderate. The GL of raw honey ranges from 10 to 24, depending on the amount consumed.While raw honey does contain some beneficial nutrients, such as antioxidants and antimicrobial compounds, you may want to consume it in moderation, especially if you have diabetes or prediabetes, as it can significantly raise blood sugar levels.1How Honey Affects Diabetes and Blood SugarHoney can have significant effects on blood sugar levels in individuals living with diabetes mellitus, particularly those living with type 2 diabetes. Although honey is a natural sweetener with some beneficial nutrients, it is still a simple sugar that can cause significant spikes in blood glucose.Eating honey can increase blood glucose levels by 30 to 60 percent within an hour of consumption. Individuals living with diabetes may want to consume honey in moderation and small amounts to avoid spikes in blood sugar levels. Combining honey with high-fiber foods, dietary fat, and protein can also help to keep blood sugar levels more stable.For people living with diabetes, the American Diabetes Association (ADA) recommends limiting honey consumption to one tablespoon per day for women and two tablespoons per day for men as part of a healthy diet.24 Potential Health Benefits of HoneyHoney has been used in natural medicine for centuries for its potential health benefits. Here are some of its potential health benefits:Contains a Variety of NutrientsHoney provides a variety of nutrients. Some of the vitamins found in honey include ascorbic acid (vitamin C), pantothenic acid, niacin, and riboflavin (B vitamins), along with minerals such as calcium, copper, iron, magnesium, manganese, phosphorus, potassium, and zinc.3Honey is a simple carbohydrate and a quick-digesting energy source. As a natural source of quick energy, honey is an ideal food for athletes or anyone needing a quick energy boost.Studies show that honey has antibacterial properties. It is a popular natural remedy for wound healing and infections.4, 5, 6Honey contains antioxidants that can help protect the body against oxidative stress. Oxidative stress is linked to chronic diseases like cancer, heart disease, and Alzheimer's.1, 7, 8Overall, honey is a natural food that provides several nutrients and may provide some potential health benefits. However, its best to consume it in small amounts as part of a balanced and varied diet.Composition of Honey: Does it Contain Fructose?Honey is a natural sweetener produced by bees from the nectar of flowers. It is a complex mixture of sugars, water, enzymes, vitamins, and minerals. The exact composition of honey can vary depending on what type of flowers the bees collect nectar from and the processing methods used.Most honey has a mixture of glucose and fructose, with fructose typically making up about 40 percent of the total sugar content. While fructose has been shown to have negative health effects when consumed in excess, the fructose found in honey is unlikely to significantly impact health when consumed in moderation.Honey vs. Sugar Glycemic Index: Which One is Better?When choosing a natural sweetener, many wonder whether honey is a healthier option than table sugar. While both honey and sugar contain carbohydrates and can raise blood sugar levels, honey has a slightly lower glycemic index than white sugar.Honey has a glycemic index of around 50 to 60, depending on the type, while white sugar has a glycemic index of 60 to 65. The lower glycemic index of honey is due to fructose, which is absorbed more slowly by the body than glucose, the primary sugar in white sugar.While honey may have a slightly lower glycemic index than sugar, both should be consumed in moderation as part of a healthy diet. Choosing natural sweeteners like honey over processed white sugar may offer additional nutritional benefits. However, its important to avoid consuming too much of any sweetener.Recommended Types of HoneyWhile many different types of honey are available, some may provide more benefits than others. Raw honey is unprocessed and provides more beneficial nutrients than processed honey. It also has a slightly lower glycemic index than processed honey.Manuka honey is a type of honey that is often promoted for its health benefits. Manuka honey comes from the nectar of the manuka tree in New Zealand and contains high levels of antibacterial compounds. Manuka honey has a unique grading system based on its antibacterial potency, known as the Unique Manuka Factor (UMF). The higher the UMF rating, the more potent the antibacterial properties of the honey.9, 10While raw and manuka honey may offer some health benefits, they are still high in calories and can cause blood sugar spikes.Bottomline: Is Honey Good for You?The answer to whether honey is good for you depends on several factors, like any health conditions you may have, how often and how much youre consuming, and the type of honey.While honey is a natural sweetener with beneficial compounds like antioxidants and antibacterial properties, it is also high in sugar and calories. People living with certain medical conditions like diabetes should be mindful that honey causes sudden spikes in blood sugar.Honey can be good for you when consumed as part of a balanced diet. If you have concerns about high blood sugar, add sources of protein and dietary fat when you consume honey. This will help to slow digestion and prevent blood sugar spikes.Using a CGM with Signos: Real-Time Data, Backed by AISignos pairs a real-time glucose biosensor with AI trained on tens of millions of data points to deliver personalized, science-backed guidance for weight management and health. See exactly how your body responds, and take action.Learn how it works. Ready to get started? Join now. A jar of honey, honeycomb and a honey dipper. Image Credit: tashka2000/iStock/Getty Images Both honey and sugar are simple sugars. Once they enter your body, they absorb quickly and work quickly to elevate your blood sugar. While you may assume that sugar and honey are high on the glycemic index, they're actually both in the moderate, and in some cases, even low on the range. Foods with a high glycemic index rating -- above 70 -- generally make your blood sugar quickly go up and then rapidly drop back down in a short period of time. If a food has a moderate score, between 55 and 69, it will still raise your blood sugar, but probably not as much as something with a higher ranking. Ideally, all the foods in your diet should be low GI, with a rating under 55. These types of foods often keep your blood sugar stable for a while. Pure honey has a typical ranking of 58 on the scale. But some varieties are even lower. The glycemic index of honey depends on how much fructose is in that particular batch. Honeys that contain 35 to 45 percent fructose, for example, score around 35 to 48 on the glycemic index. White table sugar, also known as sucrose, is higher, with a glycemic index between 58 and 65.People often consider honey to be healthier than sugar, but it depends on the use. Like sugar, honey is high in carbs, can raise blood sugar levels, and is high in calories. Both honey and sugar add sweetness to meals and snacks. However, they have different tastes, textures, and nutritional profiles.This article explores the benefits and disadvantages of both honey and sugar for health and diet.People have been using honey since ancient times as both a sweetener and for its medicinal properties.Below are some of the health benefits associated with honey.Research indicates that honey varies in its nutritional composition based on the origin of the nectar the bees used to make it. In general, it contains trace amounts of local pollen along with other substances, such as:amino acidsantioxidantsenzymesmineralsvitaminsDark honey may contain more antioxidants than light honey.Typically, honey is less processed than refined sugar as manufacturers usually only pasteurize it before use. Raw honey is also edible.Additionally, research indicates that honey is higher in fructose than glucose. Fructose is sweeter than glucose, so a person may only need to use a small amount of it to sweeten their food or drinks. Research into the medicinal uses of honey is ongoing. However, some potential uses include:Cough suppressant: Some research suggests that consuming honey may be a natural way to ease an acute cough in children. However, the researchers also highlighted that further higher quality studies are necessary to understand its efficacy.Allergy relief: A 2020 review of research found that some studies indicate that honey may be an effective anti-allergic agent. However, the authors of the review highlighted that there are gaps in research and more clinical studies into the topic are needed.Wound healing: A 2021 review of research suggests that medical grade honey could be a potential alternative to antibiotics or complementary therapy for treating locally infected wounds. Table sugar comes from sugarcane, sugar beet, and other plants. Although it is derived from natural substances, sugar needs a lot of processing before it becomes the finalized product that people consume.Sugar contains around 50 calories per tablespoon, while honey has about 64. However, honey is sweeter than sugar, so less may be needed to achieve the same sweetness.Additionally, sugar is typically low cost, easily accessible, and has a long shelf life. People may also find it makes many foods more palatable.Some disadvantages associated with sugar consumption include:High calorie count: While sugar contains less calories per tablespoon than honey, it is still a high calorie substance.Risk of certain health conditions: Consuming too much sugar can increase a persons risk of developing type 2 diabetes, obesity, and heart disease.Tooth cavities: According to the WHO, dietary sugar contributes to the development of dental caries, or cavities. Changes in gut bacteria: Research indicates that a high sugar diet may disrupt gut bacteria diversity, which may cause a range of health effects, such as increased inflammation in the body.The American Heart Association suggests the following tips for cutting down on sugar intake:Cut portions in half: Use a half spoon of sugar in drinks and on cereals instead of a full spoon.Reduce sugar in baking by one-third: This reduces intake without having a big impact on flavor or texture.Use extracts or spices: Extracts such as almond or vanilla can provide a sweet flavor to smoothies or baked goods without increasing sugar intake. Ginger, cinnamon, and nutmeg are examples of spices people use in baking.Substitute unsweetened applesauce or mashed banana: These natural fruit purees can be substituted for sugar in equal amounts in baking and other recipes.Replace with fruit: Fresh berries, bananas, mango, and other fruits can add sweetness to food. People may also use fruit canned in water, ideally they should avoid using fruit canned in syrup.Choose foods with low amounts of added sugar: People can look at the nutritional labels on food to find out how much added sugar they containLimit non-nutritive sweeteners: Examples include aspartame, saccharin, and sucralose. People often substitute sugar for these sweeteners when they are trying to lose weight. However, as they are low in calories a person may start to eat them in higher quantities, having the opposite effect.People can apply the same tips above if they wish to reduce how much honey the consume.People can consume too much of both honey and sugar. The risks of overconsumption are the same for both, they include increased risk of certain health conditions, like obesity, heart disease, and type 2 diabetes.A person should speak with a healthcare professional if they are concerned about their honey or sugar intake. A doctor can recommend whether a person needs to limit their intake or make any other dietary changes.Nutrition / DietObesity / Weight Loss / Fitness

Honey glycemic index. Glycemic index of coconut sugar vs honey. Glycemic index of honey vs table sugar. Does honey have the same glycemic index as sugar. Gi honey vs sugar. Glycemic index of honey vs cane sugar. Glycemic index of raw honey vs sugar. Glycemic index of white sugar vs honey. Glycemic index of honey vs sugar vs jaggery. Does honey have a lower glycemic index than sugar. Glycemic index of honey vs maple syrup vs sugar.

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- i-star portable dab radio instructions
- xusedudu
- http://sabaimakmak.com/ckfinder/userfiles/files/82659aeb-c7ac-42e5-8867-43c1932475b4.pdf