



ANALYSIS OF BEE PROPOLIS AS A HYPOGLYCEMIC AGENT AND DIABETES CONTROL

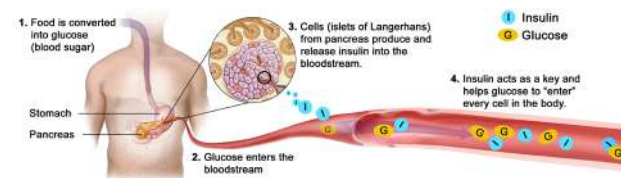
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REMARKS

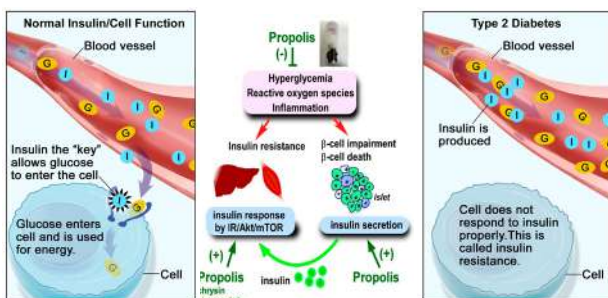
The main mechanism for controlling blood glucose levels in type I and II diabetes is insulin therapy. In type I diabetes, the pancreas stops producing insulin. Therefore, glucose control is entirely dependent on external administration of this hormone. In type II, the body develops insulin resistance or the pancreas doesn't produce enough.



Propolis, a resinous substance collected by bees, has been studied for its potential benefits in managing diabetes, particularly Type II diabetes.



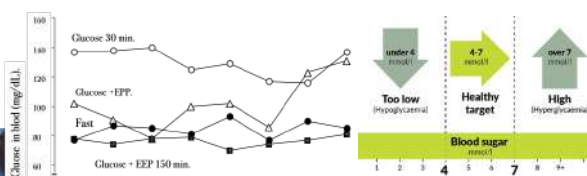
Research suggests that it may help control blood glucose levels through several mechanisms. The key compounds in propolis, especially flavonoids and other polyphenols, are believed to be responsible for its effects. Here's a breakdown of how propolis may help with diabetes control. In the pancreas, GLUT2 detects the blood glucose level and triggers the release of insulin.



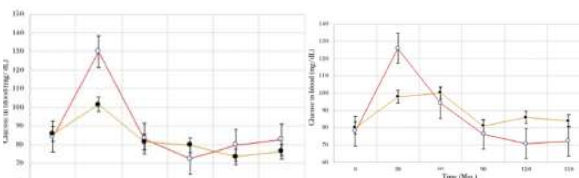
- Propolis can increase the activity of glucose transporter 4 (GLUT4), a protein responsible for moving glucose from the bloodstream into muscle cells. This improves the body's ability to use glucose, lowering blood sugar levels.
- It has powerful antioxidant and anti-inflammatory properties. In animal models, it has been shown to protect the insulin-producing beta cells in the pancreas from damage caused by oxidative stress. This can help preserve their function and improve insulin secretion.
- Chronic low-grade inflammation is a hallmark of insulin resistance and Type II diabetes. Propolis can suppress the production of pro-inflammatory cytokines, which may help to reduce inflammation and improve overall metabolic health.

MATERIALS AND METHODS

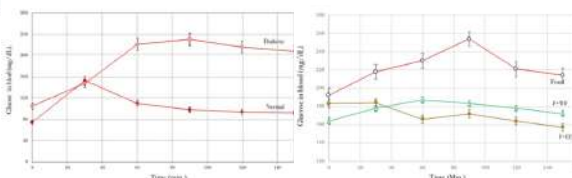
The hypoglycemic effect of propolis was evaluated in healthy young adults of both sexes, aged 17–24 years. A preliminary pilot study was conducted to determine baseline blood glucose levels in 45 volunteers who fasted for 11 hours prior to testing. After a 15-day interval, glycemic curves were obtained by administering 300 mL of a glucose solution (0.25 g·mL⁻¹) and recording blood glucose at 30-minute intervals over 2.5 hours. In a subsequent trial under the same conditions, participants received 300 mL of a glucose solution (0.25 g·mL⁻¹ in water) supplemented with an ethanolic propolis fraction identified as having the highest total flavonoid content. Blood glucose was again measured every 30 minutes over 2.5 hours. Each propolis dose contained 6.1 mg of flavones plus flavonols and 119 mg of total flavanones.



In the studied population, fasting glucose averaged 82.3 ± 7.10 mg/dL, increased to 127.1 ± 9.65 mg/dL after glucose ingestion, and then declined to 83.3 ± 11.7 mg/dL at 60 min and 72.4 ± 12.3 mg/dL at 90 min. When comparing these results with those obtained under glucose + EEP treatment, a regulatory effect of propolis components was evident: glucose levels decreased from 127.1 ± 9.65 mg/dL to 99.8 ± 21.9 mg/dL in men ($\approx 21\%$ reduction) and from 121.5 ± 7.90 mg/dL to 117.3 ± 0.50 mg/dL in women at 30 min. The mean difference of 27.3 mg/dL was statistically significant. Overall, EEP tended to regulate glucose levels over time, contributing to the maintenance of basal levels as glucose naturally declined.



In diabetic adults, averages of 115 to 205 mg dL⁻¹ were observed for pre and postprandial conditions. In the phases after evaluating the glycemic curves for each of the observation groups, administration of a standard dose of solution (EEP) demonstrated a substantial effect on blood glucose levels. This condition suggests that the solutions (EEP) can contribute to the control and modulation of the metabolic rate of blood glucose in humans, with possible modulations on the lipid profiles of patients with diabetes problems.



Propolis may inhibit the activity of enzymes like alpha-glucosidase and alpha-amylase, which break down carbohydrates in the gut. Bee propolis extracts led to decreased levels of blood glucose (FBG), fructosamine (FRU), malonaldehyde (MDA), nitric oxide (NO), nitric oxide synthetase (NOS), total cholesterol (TC), triglyceride (TG), low-density lipoprotein cholesterol (LDL-C), very low-density lipoprotein cholesterol (VLDL-C) in serum.

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Propolis is a natural product derived from plant resins collected by honey bees. This natural product has been used in folk medicine for centuries. The main chemical classes present in propolis are phenols, flavonoids are well-known plant compounds with biological activity

properties, including anti glyceimic effect. This study tested the impact of Colombian propolis as a regulating agent of glucose concerning metabolic activity on 45 healthy young people of two sexes aged between 17 and 24 years and five men as volunteers with a medical declaration of hyperglycemia was considered. The metabolic conditions for glucose were evaluated in pre-and postprandial conditions besides the blood group and the arterial pressure. The work was carried out in three different stages that included the characterization of total equivalent flavonoids present in an ethanolic fraction of propolis, in a second phase, the glycemia curves in a group of volunteers that were evaluated, and in the final phase, a regulatory effect of EEP on blood glucose. Equivalent total flavonoids in propolis samples were evaluated, and samples from Cucaita were used as an antihyperglycemic test. Fasting glucose levels in the studied population was of $82,3 \pm 7,10$ mg dL⁻¹, which conform to a normal distribution and which evolves to $127,1 \pm 9,65$ mg dL⁻¹ after ingestion of glucose solution and subsequently at $83,3 \pm 11,7$ and $72,4 \pm 12,3$ mg / dL at 60 and 90 min. When comparing these values with the glucose and EPP treatments given in the test, the regulatory effect of the propolis components is observed. Normally, the absorption of glucose in the body occurs rapidly, and blood glucose levels rise within 30 to 60 min. of fluid intake. Diabetes is a metabolic disorder in which there is an inability to oxidize carbohydrates generated by disturbances in insulin function. Propolis may have acted indirectly by increasing β cell insulin secretion and improving insulin sensitivity.