

Original Article

Impaired cognitive performance and metabolic disturbance in streptozotocin-nicotinamide induced type 2 diabetes mellitus and the protective effect of nigerian propolis

Abdulbasit Amin, Halima Saliu, Emmanuel O. Solomon, Tajudeen Shehu, Aminu Imam, Wahab I. Abdulmajeed, Abdulmusawwir Alli-Oluwafuyi, Ridwan B. Ibrahim, Bamidele V. Owoyele

ABSTRACT

Defects in insulin signaling and oxidative stress are implicated in cognitive dysfunction in diabetes. This study evaluated the effects of propolis on cognitive impairment in streptozotocin-nicotinamide model of type 2 diabetes mellitus in Wistar rats. Diabetes was induced by single intraperitoneal administration of streptozotocin (65 mg/kg) 15 min after nicotinamide (110 mg/kg) had been administered. Diabetic animals were treated with glibenclamide (5 mg/kg), propolis (200 and 300 mg/kg), or normal saline for 4 weeks after which spatial memory was assessed with the Morris' water maze (MWM). At the end of the study the animals were euthanized and blood collected via cardiac puncture while the brain was homogenized. Insulin was assayed from plasma while malondialdehyde (MDA), superoxide dismutase (SOD), glutathione (GSH) and catalase were assayed from brain homogenate. Homeostatic model assessment (HOMA) was used as marker for insulin resistance. Significant rise in blood glucose, plasma insulin, and brain MDA ($P < 0.05$) with reduction in SOD, GSH, and catalase levels were observed in the diabetic group. Treatment with 200 and 300 mg/kg propolis and glibenclamide significantly decreased blood glucose, plasma insulin, and MDA ($P < 0.05$) and increased brain levels of SOD, GSH and catalase. Propolis (200 and 300 mg/kg) also significantly ($P < 0.05$) decreased escape latency in the MWM in comparison to the diabetic group. Nigerian propolis thus seems to protect against impaired cognitive performance in experimental diabetes mellitus.

Keywords: Spatial memory, insulin resistance, oxidative stress, Morris water maze, Nigerian propolis
