

The potential of *Trigona* honey in reducing blood glucose levels: Evidence from an experimental Type 2 diabetes mellitus in *Rattus norvegicus*

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ABSTRACT

Prolonged administration of synthetic antihyperglycemic drugs, including metformin, sulfonylureas, and insulin, has been linked to several side effects such as gastrointestinal disturbances, liver toxicity, hypoglycemic events, and reduced therapeutic responsiveness. The present research investigated how stingless bee (*Trigona*) honey influences blood glucose regulation, considering different doses and treatment durations, in an alloxan-induced type 2 diabetic rat model. This study applied a true experimental method with a post-test-only control group design, involving 30 male Wistar rats that were randomly assigned into four categories: a normal group receiving distilled water, a diabetic group induced with alloxan at a dose of 150 mg/kg BW, and two experimental groups administered *Trigona* honey at 1.35 ml/200 g BW and 2.70 ml/200 g BW, respectively. Blood glucose concentrations were assessed using a glucometer device. The collected data were subjected to analysis through ANOVA, Kruskal–Wallis, and paired *t*-tests. Findings indicated a marked decline in glucose concentration on the seventh day in both treatment groups, recording 133 ± 95.6 mg/dL ($p = 0.006$) for the lower dosage and 236.3 ± 197.2 mg/dL ($p = 0.012$) for the higher dosage. Moreover, statistically meaningful differences in glucose levels among the groups were noted on day five ($p = 0.002$) and day seven ($p = 0.012$). The higher dose group approached normoglycemic levels, indicating a dose- and time-dependent effect when compared with the diabetic control group. In conclusion, *Trigona* honey demonstrated significant antihyperglycemic effects compared with diabetic controls, likely mediated through antioxidant and insulin-sensitizing bioactive compounds such as flavonoids and polyphenols, particularly at higher doses with prolonged administration.

Keywords: Antihyperglycemic, blood glucose, dose-dependent, rat model, *Trigona* honey, type 2 diabetes mellitus