

***In vivo* and *in silico* approaches for exploring the hypoglycemic potential of *Moringa oleifera* Lam. flowers' extract**

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ABSTRACT

Moringa oleifera, also known as shajina, is rich in bioactive phytochemicals, including flavonoids, alkaloids, and phenolics, which contribute to its therapeutic potential. Various parts, including leaves, barks, and flowers exhibit antioxidant, anti-inflammatory, and antimicrobial properties. The present study was designed to explore the antidiabetic potential of the flower extract through the *in vivo* and *in silico* study. The hypoglycemic activity of the flower extract was evaluated in Wistar rat using an oral glucose tolerance test (OGTT), while molecular docking identified key phytochemicals targeting diabetic pathway proteins. The *in vivo* study revealed significant glucose-lowering effects of flower extract fractions, particularly n-hexane (NHF) and chloroform. At 200 mg/kg, both n-Hexane and chloroform fractions reduced blood glucose by 30.22% and 33.83%, respectively, increasing to 37.01% and 49.86% at 400 mg/kg, nearing the standard hypoglycemic drug miglitol's 53.92% efficacy. *In silico* analysis showed strong binding affinity of kaempferol, quercetin, and ar-turmerone to pancreatic alpha-amylase (5E0F) with binding energies of -8.8, -9.0, and -6.9 kcal/mol, respectively. ADMET analysis confirmed their favorable pharmacokinetics, including good solubility, non-toxicity, and non-carcinogenicity. The outcomes of the study assist in concluding the presence of some bioactive substances with promising hypoglycemic activity.

Keywords: Bioactive Phytochemicals, diabetics, hypoglycemic activity, molecular docking, *Moringa oleifera*,