Optimization of extraction parameters for enhanced antihyperglycemic activity of Cecropia glaziovi Sneth using Design of Experiments

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Introduction: Herbal extracts are widely used to treat diseases in traditional Brazilian medicine. However, the increased need for predicting the optimal extractive conditions represents a growing challenge in the search for phytopharmaceuticals with a high level of uniformity, reproducibility, stability and biological activity. We evaluated the variables associated with C. glaziovi leaves extraction in order to maximize the chlorogenic (CGA) and caffeic (CFA) acids content for enhanced antihyperglycemic activity.

Methods: The maceration (M), maceration accelerated by heating and agitation (M60) and ultrasound (U) extraction methods applying different drug contents, extraction times and ethanol concentrations were evaluated using the response surface methodology (RSM). The statistical regression model was established for the determination of an optimized set of extraction conditions. The antihyperglycemic activity for the optimized dried extract (ODE) was determined in male Wistar rats, p.o.

Results and Discussion: It was possible to establish the optimum extraction as that prepared with 27% ethanol applying the maceration method for 3 days at room temperature (Fig. 1). Under these conditions, the CGA and CFA contents were 87.80 ± 0.75 and 32.13 ± 0.27 µg/g, respectively. The ODE showed antihyperglycemic activity in the dose range of 50 up to 200 mg/kg (Fig. 2).

Conclusion: The ODE obtained applying specific extraction conditions had the highest concentrations of CGA and CFA and significant antihyperglycemic activity.

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Figure 1. Graphical representation of the desirability of the optimum extraction conditions.

Figure 2. Effect of ODE and glipizide on serum glucose levels in oral glucose tolerance curve. Values expressed as mean ± S.E.M.; n= 6 in triplicate for each treatment. Statistically significant difference compared to the corresponding hyperglycemic group; *p≤0.05; **p≤0.01; ***p≤0.001.