

Effect of Aqueous Root Extract of *Rauvolfia Obscura* K. Schum (Apocynaceae) on Glycemia in Wistar Rats

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Received September 20, 2024; Revised September 27, 2024; Accepted September 30, 2024

ABSTRACT

Rauvolfia Obscura is a plant used in Congolese pharmacopoeia for its numerous therapeutic virtues, including the treatment of diabetes. The aim of the present study was to contribute to the treatment of glycemia using *Rauvolfia obscura* root bark in Wistar rats. Twenty-five (25) rats were divided into five batches of five (5) animals each for the two studies (hyperglycemia and hypoglycemia). In either study, aqueous extracts of *Rauvolfia. obscura* root bark (100, 250 and 500 mg/kg PO.) were compared with distilled water (0.5 ml/100 g body weight) and Metformin (10 mg/kg PO). Hyperglycemia was induced by overloading normoglycemic animals with 10% glucose at 3 g/kg body weight for antihyperglycemic activity. Baseline blood glucose levels were measured prior to treatment. After administration of the products, the blood glucose level of each rat was measured every 30 min for five hours, using an SD code free glucometer. Analysis of the results shows that the aqueous extract of *Rauvolfia obscura* bark (500 mg/kg) significantly ($P<0.001$) reduces blood glucose levels from the first hour. However, at a dose of 100 mg/kg, the aqueous extract of the plant's root bark led to hypoglycemia from the third hour onwards. The reference molecule metformin, on the other hand, maintains blood glucose levels between 0.8 and 0.95 g/l, i.e. normal values. This aqueous extract is recommended for people suffering from hyperglycemia.

Keywords: *Rauvolfia obscura*, Anti-hyperglycemia, Hypoglycemia, Aqueous extract

INTRODUCTION

Everyone is concerned about avoiding variations in blood sugar levels. This fear is linked to the devastating prevalence of diabetes worldwide. In fact, the contemporary person engages in dietary self-discipline in order to avoid diabetes. To this end, he or she limits the consumption of any food likely to bring glucose into the body. Hyperglycemia is understood as an increase in blood glucose levels. Recent data reveal that there are around 382 million people with diabetes worldwide, representing a prevalence of 8.3% in the rising number of premature deaths due to diabetes [1]. Pharmacological products are widely sold in all societies. But victims remain unsatisfied. One category relies on the medicinal plants they find cheapest in their environment. *Rauvolfia obscura*, a plant of the apocynaceae family, is well known in the Congolese pharmacopoeia and has been the subject of numerous studies, including acute toxicity and the aphrodisiac effect of the aqueous extract of root bark [2]. The literature provides no information on the effect of this plant on blood sugar levels. The efficacy of this plant in lowering blood glucose levels is the focus of this work, which aims to contribute to the treatment of blood glucose levels using *Rauvolfia Obscura* root bark in Wistar rats.

MATERIALS AND METHODS

Animal material

Wistar rats weighing between 120 and 140g and aged 4 months were used. These rats were supplied by the animal house of the Normal Superior School (ENS) of the Université Marien Ngouabi.

Plant material

Root barks of *Rauvolfia obscura* K. Schum (Apocynaceae) were used. The roots were harvested in Gamboma, 365 km from Brazzaville in the Plateaux department, in March 2023. Identification was carried out by systematist botanists from the Faculty of Science and Technology, then completed at

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Citation: Ondélé R, Itou RDGE, Epa C, Batamio AN & Ossibi AWE. (2024) Effect of Aqueous Root Extract of *Rauvolfia Obscura* K. Schum (Apocynaceae) on Glycemia in Wistar Rats. BioMed Res J, 8(3): 800-803.

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the botany laboratory in Brazzaville, where a sample was deposited under number: IEC001856 dated 9/12/96.

Methods

Preparation of aqueous extract

Fifty grams (50 g) of *Rauvolfia obscura* powder were macerated in 500 ml of distilled water for 48 h. After filtration through absorbent cotton and “Wattman” filter paper, the macerate was concentrated in a water bath thermostated at 55°C, to obtain the brown-colored aqueous extract. The aqueous extract obtained was stored in a flask. This aqueous extract enabled us to carry out our laboratory work:

- Study of anti-hyperglycemic activity in wistar rats
- This study was carried out according to the method described by Ampa [3]
- 25 rats were divided into 5 batches, each containing five (5) rats
- Batch 1 (negative controls): animals received distilled water at a dose of 0.5ml/100kg
- Batch 2 (positive controls): animals received metformin (reference molecule) at a dose of 10mg/kg

Batches 3,4,5: animals received aqueous extract of *Rauvolfia Obscura* root bark at doses of 100, 250 and 500mg/kg respectively. Temporary hyperglycemia was induced beforehand in each rat, by overloading them with glucose (10%) by intragastric gavage at a dose of 3g/kg. Glycemic monitoring of each animal was carried out before administration of the products, then 30 min, 1 h, 2 h, 3 h, 4 h

and 5 h after administration of the aqueous extract of *Rauvolfia obscura* root bark.

Hypoglycemic activity in rats

This study was carried out according to the method described by Ampa [3].

25 rats were divided into 5 batches, each containing five (5) rats as follows:

Batch 1 received distilled water (0.5ml/100g);

Batch 2 received metformin (10mg/kg);

Batches 3,4,5: received aqueous extract of *Rauvolfia Obscura* root bark (100, 250 and 500 mg/kg).

The animals were fasted 18 hours before administration a of the aqueous plant extract.

Blood glucose levels were recorded for each animal before administration, and 30 min, 1 h, 2 h, 3 h, 4 h and 5 h after administration.

Phytochemical profile of *Rauvolfia obscura* K. Schum root bark

Chemical screening of *Rauvolfia obscura* root bark powder was carried out using classical phytochemical tests based on staining and precipitation reactions [4].

RESULTS

Anti-hyperglycemic effect of *Rauvolfia obscura* aqueous extract in wistar rats

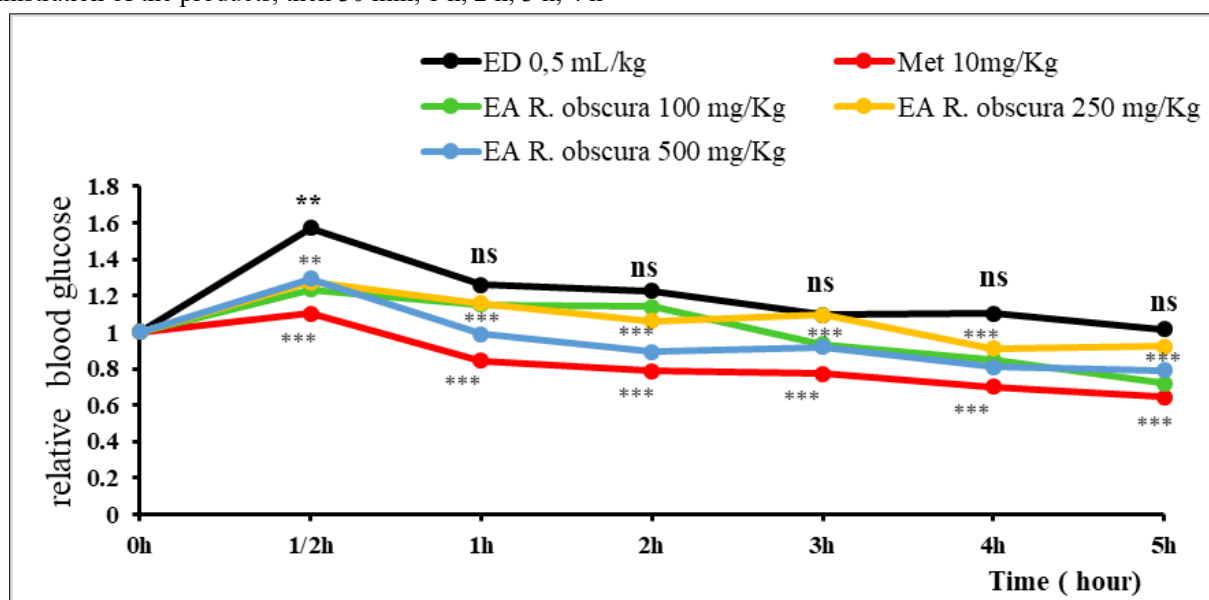


Figure 1. Effect of *R. obscura* root bark aqueous extract on anti-hyperglycemic activity in Wistar rats.

Values are means \pm MSE with $n=5$, * $p<0.05$; ** $p<0.01$ and *** $p<0.001$; significant differences from control rats. E. D=distilled water.

Hypoglycemic effect of aqueous extract of *Rauvolfia obscura* in Wistar rats**Table 1.** Effect of aqueous extract of *R. obscura* root bark on hypoglycemic activity in rats.

Treatment	Average relative blood glucose values (g/L); (Percentage reduction in blood glucose levels)					
	0 h	1 h	2 h	3 h	4 h	5 h
Distilled water 5 mL/Kg	1,00 ± 0,00	1,15 ± 0,11; (1,00%) ^{ns}	1,05 ± 0,06; (- 5,25%) ^{ns}	1,08 ± 0,09; (- 8,09%) ^{ns}	1,04 ± 0,04; (- 4,12%) ^{ns}	1,09 ± 0,04; (- 9,52%) ^{ns}
Met 10 mg/Kg	1,00 ± 0,00	0,95 ± 0,01; (4,85%) ^{ns}	0,93 ± 0,04; (6,91%) ^{ns}	0,89 ± 0,05; (10,78%) ^{ns}	0,97 ± 0,07; (2,73%) ^{ns}	0,79 ± 0,03; (20,17%) ^{***}
<i>R. obscura</i> (100 mg/Kg)	1,00 ± 0,00	0,87 ± 0,08; (12,22%) ^{ns}	0,80 ± 0,07; (19,08%)*	0,76 ± 0,09; (23,70 %)*	0,79 ± 0,09; (20,92 %)*	0,69 ± 0,04; (30,26%)**
<i>R. obscura</i> (250 mg/Kg)	1,00 ± 0,00	0,95 ± 0,05; (1,67%) ^{ns}	0,99 ± 0,04; (0,60%) ^{ns}	0,93 ± 0,05; (6,13%) ^{ns}	0,90 ± 0,04; (9,78%) ^{ns}	0,87 ± 0,04; (12,65%)**
<i>R. obscura</i> (500 mg/Kg)	1,00 ± 0,00	1,11 ± 0,05; (- 11,66%) ^{ns}	1,00 ± 0,05; (- 0,80%) ^{ns}	0,93 ± 0,03; (6,34%) ^{ns}	0,94 ± 0,04; (5,28%) ^{ns}	0,88 ± 0,05; (11,35%)*

Values are means ± MSE with n=5, *p<0.05; **p<0.01 and ***p<0.001; significant differences from control rats. ED=distilled water. Met: metformin (reference molecule).

Phytochemical profile results (Table 2)

Table 2. Results of chemical screening of *Rauvolfia obscura* root barks.

Chemical Families	Appreciation
Tannins	+
Alkaloids	-
Flavonoids	+
Saponosides	-
Oses-hosamines	-
Mucilages	+
Free anthraquinones	+
Steroids and terpenoids	-

DISCUSSION

The aim of the present study was to contribute to the treatment of glycemia using *Rauvolfia obscura* root bark in wistar rats. Administration of the aqueous extract of *Rauvolfia obscura* root barks (100, 250 and 500 mg/kg) in rats made hypertensive by glucose overload (3g/kg CP), showed a highly significant (***)P<0.001 decrease in blood glucose levels (Figure 1). Analysis of these results shows that this reduction is dose-dependent. Thus, this decrease occurs from: 3, 4 and 1 h, respectively at doses of 100, 250

and 500 mg/kg. The 500 mg/kg dose is therefore the most effective, as it reduces blood glucose levels at an early stage. At this dose, the aqueous extract of *Rauvolfia obscura* roots has an action similar to that of metformin (10mg/kg). Metformin reduces hepatic glucose production and, to a lesser extent, gastrointestinal glucose absorption and increases glucose utilization by peripheral tissues [5]. The results of this study are similar to those of N'doua et al [6] on the hypoglycemic and anti-hyperglycemic effects of the 70% ethanolic extract of the roots of *Rauvolfia vomitoria* afzel (apocynaceae), which also showed a decrease in blood glucose levels caused by glucose overload. In this study, the hypotensive effect of *Rauvolfia obscura* aqueous extract was also evaluated. Administration of *Rauvolfia obscura* aqueous extract (100, 250 and 500 mg/kg) to normoglycemic rats produced a non-significant (P<0.05) decrease in blood glucose levels (Table 1). The reduction in blood glucose is explained by the effect of the plant. The results of this study once again confirm the findings of the previous study discussed above. These results suggest that, at this stage of the study, the aqueous extract of *Rauvolfia obscura* root bark has anti-hyperglycemic properties. The chemical profile carried out on the plant's root bark for this study reveals the presence of the chemical family's free tannins, flavonoids, mucillages and Antraquinone (Table 2). Numerous studies on aqueous extracts of medicinal plants have shown that flavonoids are responsible for lowering blood sugar levels when these extracts are administered to hyperglycemic rats, as in the case of aqueous extracts of *Spondias purpurea* L

[7]. and *Vernonia colorata* [8]. The roots of *Rauvolfia obscura* have hypoglycemic properties, and are recommended for diabetics.

CONCLUSION

At the end of this study on the anti-hyperglycemic and hypoglycemic activity of the aqueous extract of *Rauvolfia obscura* root barks in wistar rats. It should be noted that administration of the aqueous extract at different doses (100, 250 and 500 mg/kg), causes a significant (**p<0.001) decrease in blood glucose levels at doses of 100 mg/kg from 3 h, 4 h and 5 h; 250 mg/kg from 4 h and 5 h; and 500 mg/kg from 1 h, then continuing until 5 h.

In normoglycemic rats, administration of the aqueous extract at different doses resulted in a non-significant (*p<0.05) increase in blood glucose levels at 500 mg/kg after 1 h, returning to the initial value of 1.00 after 2 h. However, there was a non-significant (*p<0.05) decrease in blood glucose levels at 100 and 250 mg/kg in normoglycemic rats. The aqueous extract of *Rauvolfia obscura* root bark is recommended for people suffering from hyperglycemia. *Rauvolfia obscura* root bark contains tannins, flavonoids, mucillages and free anthraquinones. Flavonoids are therefore responsible for the anti-hyperglycemic activity observed with olante root bark. *Rauvolfia obscura* roots are a good remedy for the treatment of hyperglycemia.

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