INTRODUCTION

Diabetes, a metabolic condition characterized by chronic high blood sugar level, is no longer just a disease of developed and wealthy countries.¹ By 2045, more than 600 million people worldwide will have diabetes.² In Côte d'Ivoire, the only national data available indicated a prevalence already at a level of 5.19%.³ Diabetes can also be a major cause of damages in the heart, vessels, eyes, kidneys and nerves.⁴ It is therefore essential to properly control the disease in order to significantly reduce the risk of complications.

High costs of conventional medicines for people in low-income countries, in addition to the difficulties of access to these drugs, direct patients towards traditional remedies. Indeed, about 80% of rural populations living in developing countries depend on traditional medicine to meet their primary health needs.⁵ Then, the World Health Organization, recognizing the importance of traditional medicine, recommends its valuation on evidence of effectiveness, quality, and safety.⁶

ABSTRACT

Background: Diabetes remains a major public health problem for which traditional medicine is a better therapeutic alternative for low-income populations, including African populations. The aim of this work was to evaluate the effect of Sarenta, an herbal preparation used in Ivorian traditional medicine as anti-diabetic, on hyperglycaemia and on basic glycaemia.

Methods: Hyperglycaemia lowering activity was led in rats receiving glucose at 5 g/kg body weight by gavage after oral pre-treatment with either Sarenta at 125, 206 or 209.5 mg/kg b. wt., either glibenclamide at 10 mg/kg b. wt., or physiological saline solution. Hypoglycaemic risk was assessed by administering the same doses of Sarenta to native i.e. NaCl-treated rats. For both tests, blood glucose was measured before any substance was administered and then every hour for 4 hours.

Results: After 4 hours, Sarenta at 206 mg/kg b. wt. and 209.5 mg/kg b. wt. significantly reduced the induced hyperglycaemia in rats by 33.87% and 37.39%, respectively. The degree of the hyperglycaemia lowering effect of the remedy at these two doses was not significantly different from that of glibenclamide. In addition, Sarenta at 209.5 mg/kg b. wt. resulted in a significant reduction of basic blood sugar to 29.78% four hours after administration.

Conclusions: The remedy Sarenta has a hyperglycaemia lowering activity that could partially justify its traditional use in the treatment of diabetes. However, considering its hypoglycemic effect, precautions should be taken when using this traditional medicine.

Keywords: Plant, Diabetes, Blood glucose
Sarenta is an Ivorian traditional remedy, mainly herbal and indicated in multiple pathologies including diabetes. Several pharmacological studies undertaken by our laboratory team have highlighted safety then analgesic, antioxidant and anti-inflammatory properties without ulcerogenic risk of this remedy.\(^7,8\) The anti-diabetic activity of Sarenta does not appear to have been studied experimentally by other scientists. The present study therefore proposed to evaluate the remedy in vivo in rats blood sugar.

**METHODS**

**Extraction procedure**

The remedy Sarenta, obtained from the traditional therapist agency (Nadieco Pharma SARL), has been evaporated in a Memmert oven for 72 hours at 50°C. The dry residue was crushed to have a fine powder of the remedy that was packaged in a bottle and kept in the refrigerator at a temperature of 5°C for later use. At the same time, the dosages claimed by the traditional therapist (2 tablespoons once a day i.e. 30 ml, 2 tablespoons twice a day i.e. 60 ml and one tea glass once a day i.e. 45 ml of the remedy) were evaporated and the dry residues allowed calculating the corresponding concentrations and then the doses to be administered to the rats, knowing that it is permissible to administrate 10 ml/kg body weight in this way, 30 ml of the remedy corresponded to a dose of 125 mg/kg b. wt., 60 ml corresponded to 206 mg/kg b. wt. and 45 ml corresponded to 209.5 mg/kg b. wt.

**Pharmacological tests**

**Oral glucose tolerance test**

The test was carried out according to the method described by Kambouche et al.\(^9\) Healthy adult Wistar albino rats weighting between 128-179 g, under 16 hours fasting conditions, were divided into five groups of six rats. First the basic blood glucose of each rat was read using a glucometer. Then immediately, the following substances were administered to rats by gavage according to their group:

- Group 1, as control, received normal saline (NaCl 0.9% at 10 ml/kg b. wt. per os);
- Groups 2, 3, and 4 received respectively graded doses of Sarenta (105, 206 and 209.5 mg/kg b. wt. per os).

Blood glucose was then measured at 30 min, 1 h, 2 h, 3 h and 4 h after glucose gavage in rats.

The variation in blood glucose was calculated using the following formula:

\[
\frac{G_t - G_0}{G_0} \times 100
\]

\(G_0=\)Blood glucose measured at 30 min after glucose gavage in rats.

\(G_t=\)Blood glucose measured at 1 h, 2 h, 3 h or 4 h after glucose gavage in rats.

**Hypoglycaemic risk assessment**

The test was carried out according to the method described by Puri.\(^10\) Healthy adult Wistar albino rats weighting between 128-179 g, under 16 hours fasting conditions, were divided into four groups of six rats. First the basic blood glucose of each rat was read using a glucometer. Then immediately, the following substances were administered to rats by gavage according to their group:

- Group 1, as control, received normal saline (NaCl 0.9% at 10 ml/kg b. wt. per os);
- Groups 2, 3, and 4 received respectively graded doses of Sarenta (105, 206 and 209.5 mg/kg b. wt. per os).

Blood glucose was then measured at 1 h, 2 h, 3 h and 4 h after substances administration.

The variation in blood glucose was calculated using the following formula:

\[
\frac{G_t - G_0}{G_0} \times 100
\]

\(G_0=\)Blood glucose measured before substances administration.

\(G_t=\)Blood glucose measured at 1h, 2h, 3h or 4h after substances administration.

**Statistical method**

Values were expressed as mean±SD (standard deviation) with n=6 rats per group. Data were analyzed with GraphPad Prism.\(^7\) software by Wilcoxon statistical test, with criterion set for statistical significance at p<0.05 for risk of \(\alpha=0.05\).

**Ethical approval**

The experimental procedures were conducted after the approval of the Ethical Guidelines of the University (Ivory Coast) Committee on Animal Resources. All these
procedures used, were in strict accordance with the guidelines for Care and Use of Laboratory Animals and the statements of the European Union regarding the handling of experimental animals (86/609/EEC).

RESULTS

Peak hyperglycaemia occurred 1 hour after glucose administration in rats, with a higher blood glucose level in rats pre-treated with normal saline. Sarenta, at 206 mg/kg b. wt. and 209.5 mg/kg b. wt., resulted in a decrease in rat blood glucose levels 2, 3 and 4 hours after induction of hyperglycaemia. Indeed, the percentages of blood glucose reduction at these sampling times were 4.83%, 19.35% and 33.87% for the dose of 206 mg/kg b. wt. The percentages of blood glucose reduction for the dose of 209.5 mg/kg b. wt. were also 6.5%, 21.95% and 37.39% (Figure 1). The intensity of the hyperglycaemia lowering effect of the remedy at these two doses was superimposed on that of glibenclamide (Figure 2).

![Figure 1: Blood glucose levels after oral glucose tolerance test in rats receiving Sarenta.](image)

**Table 1: Basic blood glucose in rats according to sampling times.**

| Groups                  | Basic blood glucose (mg/dl) | T0       | T1       | T2       | T3       | T4       | P value          |
|-------------------------|----------------------------|----------|----------|----------|----------|----------|-----------------|
| Normal saline NaCl 0.9% |                            | 97.83±11.14 | 96.17±9.56 | 93±9.94 | 90.67±8.09 | 88.67±10.01 | 0.0268          |
| Sarenta 125 mg/kg b. wt.|                            | 89.16±9.02 | 91.5±9.24 | 89.67±9.24 | 80.83±10.12 | 74.17±12.07 | 0.0004          |
| Sarenta 206 mg/kg b. wt.|                            | 83±11.52  | 82±12.01 | 80.17±13.15 | 76.17±11.21 | 69.83±10.45 | 0.0001          |
| Sarenta 209.5 mg/kg b. wt.|                         | 94.5±17.05 | 76.83±13.23 | 73±15.36 | 71.5±14.92 | 66.83±9.62 | 0.0001          |

At the dose of 209.5 mg/kg b. wt., Sarenta resulted in a significant decrease in rat basic blood glucose to 29.78% 4 hours after administration. However, the doses of 206 mg/kg b. wt. and 125 mg/kg b. wt. resulted in a slightly decrease in rat basic blood glucose to 15.87% and 16.82% respectively 4 hours after administration (Table 1).
Finally, the dry residues obtained from the remedy were not proportional to the starting volumes so that the doses were not reproducible. Standardization of the different preparation processes would make it possible to move towards an antidiabetic plant drug.

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