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ANTIDIABETIC AND ANTIOXIDANT ACTIVITIES OF MARANTHES GLABRA (OLIV.) BARKS EXTRACTS, AND PHENOLIC PROFILE OF CRUDE EXTRACT

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ABSTRACT

Maranthes glabra known under the vernacular name "Yandza teke" is a medicinal plant of the family Chrysobalanaceae, widely used in traditional medicine in Congo. In the present work, three extracts have been prepared from the bark of this plant: ethanolic, hydroethanolic and aqueous extracts. The aqueous extract was administered to normoglycemic albino wistar rats, in temporary hyperglycemia after glucose overload and made diabetic by administration to the penis dorsal vein of streptozotocin at 50 mg / kg body weight. The results showed that after 2 hours, basal blood glucose levels in normal rats significantly increased from 0.86 ± 0.05 to 0.75 ± 0.05 g / L at 500 mg / kg of aqueous extract, and from the third hour, aqueous extract at 200 mg / kg induces a significant blood glucose level decrease ($P < 0.05$). The oral glucose tolerance test showed hyperglycemia in rats one hour later. This hyperglycemia was expressed mainly in the control rats that received distilled water, compared to rats treated with glibenclamide and at different extract concentrations. The aqueous extract of Maranthes glabra therefore has the ability to protect animals against hyperglycemia. Glycemic monitoring of diabetic rats revealed that there was a significant ($P < 0.05$) and / or more marked ($P < 0.01$) reduction in blood glucose up to the third hour for both extract concentrations (200 and 500mg / kg). The antioxidant evaluation by the DPPH method indicated that the ethanolic extract had a good antioxidant efficiency exceeding (IC50 = 0.195 ± 0.001 mg / ml) that of gallic acid (IC50 = 0.234 ± 0.000 mg / ml) because of the lower concentration. The chemical screening of bark made by standard colorimetric reactions has shown the richness of these in different chemical families. And the quantitative evaluation of polyphenols and total flavonoids by the colorimetric method showed that the three types of extracts are rich in these phenolics.

KEYWORDS: *Maranthes glabra extracts*, antioxidant activity, antidiabetic activity.

INTRODUCTION

Diabetes is a major cause of morbidity and mortality in the adult population and having profound impact on the quality of the human life. It may results to hypoglycemia, hyperglycemia, renal dysfunction, and cardiovascular complications (Sreedharan, 2018). It has estimated that there was a global prevalence of 425 million people with diabetes in 2017 that is expected to rise to 629 million by 2045 (Forouhi and Wareham, 2018). It represents a set of autoimmune, metabolic and genetic disorders.

The body generates free radicals due to metabolic processes while antioxidant systems are present in the body to disarm them. This homeostasis gets disturbed due to excess free radical production, depletion of antioxidants or both. Thus, when body's antioxidant system is inadequate, cells get exposed to high levels of free radicals i.e. reactive oxygen species (ROS), reactive

nitrogen species (RNS) or reactive sulphur species (RSS); the condition called oxidative stress Corrochano et al., 2018, Ahangarpou et al., 2019). Oxidative stress is responsible for cell injury such as protein and lipid peroxidation, DNA fragmentation, racemization or decarboxylation of amino acids, enzyme dysfunction, breakdown of carbohydrates and aggravates various chronic diseases like diabetes, cancer, rheumatism and heart diseases (Li et al., 2015). Excess concentration of glucose in blood is one of the most important causes of diabetes secondary disorders like angiopathy, cataract, neuropathy, deficiency in the antioxidant defence system and lipid profile disorders (Ahangarpour et al., 2019). There is a strong consistent relationship between oxidative stress-induced hyperglycemia and progression of diabetic complications in patients with diabetes.

Natural antioxidants obtained from plant play an important role in protecting the body against damage from reactive oxygen species Wang et al., 2018). Maranthes glabra is a plant largely used in African traditional medicine (Bouquet A., 1969, Bouqquet and Jacquot 1967, Adjanohoum et al., 1988, Conde et al., 2009, Afshar 2010, Ahombo et al., 2012, WHO, 2014, Ampa 2014, Epa 2015, Meriem 2015, Ampa et al., 2018). In Congo stem-barks of Maranthes glabra, are commonly used as a antidiabetic as well as for the management and treatment of oxidative stress (Bouquet A., 1969, Bouquet and Jacquot 1967, Morabandza et al., 2016). Therefore, this present study is designed to evaluate the antidiabetic effect of barks extract of *M. glabra* in streptozotocin induced diabetic rats and their antioxidant effects. This is in view to scientifically substantiate the traditional use of this plant as antidiabetic herb.

METHODS

Plant material

Samples of M. glabra used in this study were collected from the western-Cuvette department in Congo-Brazzaville in February and March 2019. Samples were identified by reference to the herbarium of the Exact and Natural Sciences Research Institute of Congo (IRSEN). *Voucher* specimens are preserved at the herbarium of IRSEN.

Moranthes glabra barks were dried at room temperature, reduced in powder and stored until extraction procedure.

Animal material

Thirty healthy, adult male wistar rats and average body weight of 250 g were used for the present study. The rats were kept under controlled conditions of temperature (23 ± 2 °C) and humidity and a 12 h light–dark cycle. The rats were kept in sanitized polypropylene cages and had free access to standard rats pellet diet and water *ad libitum*. All the experimental procedures were performed in accordance with the Ethic Committee of Marien Ngouabi University.

Preparation of the bark extracts of Maranthes glabra

The dried powder from the dried barks (50 g) was extracted by the maceration technique in distilled water, distilled water/alcohol mixture and in 90% ethanol under magnetic stirring during 72 hours. The solutions obtained were concentrated under reduced pressure (BÜCCHI rotavapor) and then preserved at +4 °C until pharmacological tests.

The concentrates obtained served as extracts to make the different dosages. The doses of 200 and 500 mg / kg were used to evaluate the antidiabetic properties.

Preparation of the glucose solution

10 g of glucose powder were dissolved in 100 ml of distilled water, and the oral administered dose was of 3g / kg of animal body weight.

Determination of the volume of the extract administered

The volume of the aqueous extract administered was determined from the following formula:

$$V = \frac{D \times B}{C}$$

D: Dose administered (mg / kg);
B: Body weight (Kg);
C: Concentration of the solution to be administered (mg / mL)

• Evaluation of the hypoglycemic effect of bark erxtracts of *M. glabra*

The method used was described by Schoenfelder et al. (2006). This activity involves administering the plant extract to normoglycemic animals and performing glycemic monitoring for a few hours. It makes it possible to evaluate the capacity of the plant extract to consume glucose by the peripheral tissues.

The rats were fasted for 16 hours and divided into five groups having five rats in each group such as:

- ✓ Group-1: Normal control rats administered with vehicle (distilled water)
- ✓ Group-2: Normal rats administered with glibenclamide (5 mg/kg) (positive control)
- ✓ Group-3 : Normal rats administered with aqueous bark extract (200 mg/kg)
- ✓ Group-4 : Normal rats administered with aqueous bark extract (500 mg/kg)

At initial time (t = 0) and 1, 2, 3, and 4 hours the fasting blood glucose levels of rats were measured using an ACCU-CHEK Active brand glucometer.

The bood glucose reduction percentage was determined by the following formula:

PRG= (Go-Gt /Go) X 100

- Go: blood glucose at initial time
- Gt: any blood glucose
- PRG = percentage-reduction -glycemia.

Evaluation of antihyperglycemic effect or glucose tolerance test

The method described by Mbodj, (2003) was used. The aim was to induce temporary hyperglycemia in rats by glucose overload (10g / kg) to check the ability of the extract to regulate blood glucose or protect the animal against hyperglycemia.

Animals were divided in four groups having five rats in each group such as :

- ✓ Group-1: Normal control rats administered with vehicle (distilled water)
- ✓ Group-2: Normal rats administered with glibenclamide (5 mg/kg) (positive control)
- ✓ -Group-3 : Normal rats administered with aqueous bark extract (200 mg/kg)
- ✓ Group-4 : Normal rats administered with aqueous bark extract (500 mg/kg)

Before any experiment the rats were subjected to a fast of 16 hours.

Aqueous extract of *M. glabra* was administered orally to rats and followed for 5 h. Blood samples were collected before the start of the treatment (t = 0) and at 1h intervals for 5 h.

Evaluation of the effect of the aqueous extract of Maranthes glabra on type II diabetes in wistar rats

The overnight fasted rats were injected by dorsal penis vein with streptozotocin (STZ) (SIGMA, Chemical-Co, USA) (50 mg/kg body weight, freshly prepared in 0.9% szodium chloride solution). After 72 h of STZ administration, blood glucose levels were checked. Rats with glucose levels varying between 1.37 and 1.94 g / L, were considered diabetic and used subsequently for the study (Tedong et al., 2007).

Rats were divided into four groups having five rats in each group such as.

- ✓ Group-1: Normal control rats administered with vehicle (distilled water)
- ✓ -Group-2: Normal rats administered with glibenclamide (5 mg/kg) (positive control)
- ✓ Group-3 : Normal rats administered with aqueous bark extract (200 mg/kg)
- ✓ Group-4 : Normal rats administered with aqueous bark extract (500 mg/kg)

Aqueous extract of *M. glabra* was administered orally to rats and followed for 5 h. Blood samples were collected before the start of the treatment (t = 0) and at 1h intervals for 5 h.

Antioxidant activity

The antioxidant activity of the aqueous, hydroethanolic and ethanolic bark extracts of Maranthes glabra and the standard drug (gallic acid) was evaluated by the quantitative method of DPPH at 517 nm previosly described by Brand-Wiliam et al. (1995). All samples were done in triplicate.

The concentration of each extract inhibiting 50 % of the free radicals was determined according to the linear regression equation of the calibration curve. Thus, the antioxidant activity was determined as percentage of inhibition (% I) of DPPH radical by following formula:

$$\%I = \frac{Absorbance - extractabsorbance}{whiteAbsorbance} x100$$

Phytochemical study

The chemical screening of bark extracts of Maranthes glabra was performed by standard tube reactions (Adjanhoum et al., 1984, Dohou et al, 2003, Dohou et al., 2004).

Determination of total polyphenols (PPT)

Total content polyphenols was evaluated by the Folin-Ciocalteu colorimetric method at 725 nm with Gallic acid as standard. The results are expressed in milligram equivalent of gallic acid per gram of dry vegetable matter (mg GAE / g DM) (Singleton and Rossi 1965). All measurements were conducted in triplicate.

Determination of total flavonoids (FVT)

Total flavonoids of the different bark extracts of Maranthes glabra were measured using the Aluminum Trichloride (AlCl3) method at 510 nm (Bahorum et al., 1996, Heim et al., 2002). Quercetin was used as a standard. Results are expressed as quercetin equivalent per milligram of extract (mg EQ / g MS). All measurements were conducted in triplicate.

Statistical analysis of the results

The results were expressed as mean values ± S.D. For the analysis of statistical significance ANOVA were applied, excepted when normality and equal variance were passed, it was followed by the Tukey test. Student's *t* test was applied to study the significance of difference between two treatment groups. In all cases, $p < 0.05$ was considered to be significant.

RESULTS

Hypoglycemic activity of the aqueous bark extracts of *Maranthes glabra*

Table I shows the effect of the aqueous extract of bark extracts of *Maranthes glabra* at doses of 200 and 500 mg / kg on the blood glucose levels of normal rats.

The bark extracts of Maranthes glabra, induced a non significant decrease in blood glucose level at the first hour of aqueous extract groups (8.75% and 10.74%). At the second hour, the aqueous extract group at 500 mg / kg induced a significant reduction ($p < 0.05$) in blood glucose level with a reduction percentage of 20.37%. From the 3rd hour to the 4th hour, aqueous extracts exhibited a continuous marked reduction of blood glucose levels ($p < 0.01$) with percentages of 24.07%

(aqueous extract group at 200 mg / kg) and 30.55% (aqueous extract group at 500 mg / kg) and appears more effective compared to negative controls treated with distilled water.

In addition, the aqueous extract at the dose of 200 mg / kg revealed a significant reduction in blood glucose ($p < 0.05$) at the third hour (17.88%) and a more pronounced reduction ($p < 0, 01$) at the fourth hour (22.44%) compared to the negative controls treated with distilled water.

Antihyperglycaemic effect of the aqueous bark extract of Maranthes glabra

Figure 1 shows the evolution of blood glucose levels for 3 hours after oral administration of the aqueous bark extract at 200 and 500 mg / kg of Maranthes glabra in rats with temporary hyperglycaemia.

The results obtained (FIG. 1) show that the rats treated with the aqueous extract at doses of 200 and 500 mg / kg do not show an 1h after extract-treatment a reduction in blood glucose. Inversely, the glibenclamide-treated rats showed a slight reduction in blood glucose compared to the control rats which received distilled water.

Administration of glucose (10%) revealed hyperglycemia in rats 1h later with blood glucose exceeding 1.55 g / l. This hyperglycemia was expressed mainly in the control rats treated with distilled water. The rats treated with glibenclamide and the two doses of aqueous extract were lower peaks of blood glucose.

However, the rats treated with aqueous extracts showed 2h after glucose overload, a significant decrease ($p < 0.05$) of blood glucose levels with the blood glucose reduction percentages of 28.57% and 29.10%. The glibenclamide-treated rats were shown 1h after glucose overload, a significant decrease ($p < 0.01$) and more pronounced until the second hour.

Antidiabetic activity of the aqueous bark extracts of Maranthes glabra

The effect of M. glabra aqueous bark extract administration on blood glucose level in STZ-treated rats is presented in Table II.

The injection of STZ-induced a significant increase in blood glucose level of STZ group treated with distilled water (1.43 ± 0.01 g/l) compared to normal control group (1.01 ± 0.00 g/l). Aqueous bark extracts exhibited a continuous marked reduction of blood glucose levels ($P < 0.01$) particularly 1–3–5 h after treatment in diabetic rats. The extract at low dose decreased significantly the blood glucose level (from 1.54 ± 0.02 g/l to 1.20 ± 0.00 g/l at 5 h) in comparison with untreated diabetic mice (1.43 ± 0.01 g/l). The effect obtained with lower dose was less marked with that obtained with glibenclamide (from 1.54 ± 0.05 g/l to 0.50 ± 0.05 g/l at 5 h). Treatment with a high dose of aqueous extract (500 mg/kg) caused a maximum reduction in blood glucose (from 1.56 ± 0.10 g/l to 1.02 ± 0.02 g/l at 5 h) compared to STZ group. However, this effect was less potent than those of the reference drug.

Evaluation of antioxidant activity

Figure 2 shows the values of the 50% inhibitory concentrations (IC50) of the DPPH radical scavenging activity by the aqueous, hydroethanolic, and ethanolic extracts, but also, those gallic acid used as standard drug. The results obtained show that the IC50s were of the order of 0.195 ± 0.001 mg / ml for the ethanol extract, 0.234 ± 0.003 mg / ml for the aqueous extract and 0.273 ± 0.001 mg / ml for the hydroethanolic extract. Furthermore, the values of the inhibitory concentrations of 50% of the radical DPPH of gallic acid (0.234 ± 0.01 mg / ml) were similar than aqueous extract (0.234 ± 0.003 mg / ml).

Phytochemical Screening

The preliminary phytochemical screening of aqueous bark extract of M. glabra revealed the presence of tannins, flavonoïds, terpenes, steroids and other components presented in Table III.

Dosage of total polyphenols

The results showed that the hydroethanol and ethanolic extract were the richest in phenolic compounds with a level of 10.59 ± 0.001 mg GAE per g of dry extract for the hydroethanolic extract and 9.18 ± 0.015 mg GAE per g of dry extract for the ethanolic extract, while the phenolic compound content of the aqueous extract is the lowest with a value of 6.9 ± 0.05 mg GAE per g of dry extract.

Dosage of total flavonoids

The total flavonoid assay shows that the highest content was that of the aqueous extract : 16.20 ± 0.15 mg EQ per g of dry extract. Both hydroethanolic and ethanolic extracts have almost the same concentrations and contain the lowest levels of total flavonoids : 11.79 ± 0.09 mg EQ per g of dry extract for the hydroethanolic extract and 12.06 ± 0.08 mg EQ per g of dry extract for the ethanolic extract.

Table I: Evolution of the average blood glucose levels of normal rats according to the doses of the aqueous extract of *Maranthes glabra* followed during four hours.

Treatment	Glucose level (en g/l) and glycemia percentage reduction (%)				
Extracts	**0 Hour**	**1 Hour**	**2 Hours**	**3 Hours**	**4 Hours**
Distilled water (10 mg/kg)	1.01±0.00	0.97±0.05 (-3.19%)	0.94 ±0.04 (0.21%)	0.96 ±0.03 (-2.76%)	0.98 ±0.03 (-4.44%)
Glibenclamide (5 mg/kg)	1.03±0.02	0,73 ±0,03 (34.23%)*	0.55 ±0.05 (49.63%)**	0.49 ±0.05 (55.07%)**	0.49±0.04 (55.61%)**
Aqueous extract (200 mg/kg)	1,02±0,01	1.00±0,02 (8,75%)	0.94±0.01 (14,23%)	0.90±0.05 (17,88%)*	0.85±0.01 (22,44%) **
Aqueous extract (500mg/kg)	1,02±0,03	0,92±0,04 (10,74%)	0,86±0,05 (20,37%)*	0,80±0,01 (24,07%) **	0,75±0,05 (30,55%)*

** p <0.05; ** p <0.01:* significant difference compared to the control batch treated with distilled water. The values represent mean glucose levels ± SD; n = 5. (%): Percentage reduction in blood glucose.

Table II: Effect of the aqueous bark extract of Maranthes glabra on the blood glucose levels of diabetic rats.

Treatments	Glucose level (en g/l) and glycemia percentage reduction (%)					
Extracts	**0 Hour**	**1 Hour**	**2 Hours**	**3 Hours**	**4 Hours**	**5 Hours**
Distilled water (10 mg/kg) +STZ	1,43±0,01	1,44±0,02 (-0,69%)	1,43±0,03 (0,00%)	1,39±0,03 (2,79%)	1,47±0,03 (-2,79%)	1,42±0,04 (0,69%)
Glibenclamide (5 mg/kg) +STZ	1,54±0,05	1,25±0,07 (18,83%)	0,96±0,05 (37,66%)*	0,87±0,03 (43,50%)***	0,70±0,06 (54,54%)***	0,50±0,01 (67,53%)**
Aqueous extract (200mg/kg)+STZ	1,54±0,02	1,39±0,01 (9,74%)	1,25±0,06 (18,83%)	1,19±0,04 (22,72%)**	1,19±0,05 (22,72%)*	1,20±0,00 (22,07%)
Aqueous extract (500mg/kg)+STZ	1,56±0,1	1,09± 0,02 (30,12%)***	0,80±0,01 (48,71%)**	0,79±0,02 (49,35%)***	1,04±0,01 (33,33%)**	1,02±0,02 (34,61%)***

* p <0.05; ** p <0.01; *** p <0.001: significant difference from control rats treated with distilled water. The values represent mean glucose levels ± SD; n = 5.

Table III: Characterization of the chemical families present in the bark extract of Maranthes glabra.

Chemical groups	Results
Alcaloïdes	±
Flavonoïdes	+ +
Saponosides	+ +
Hétérosides cardiotoniques	+ +
Anthraquinones	+
Tanin	+ +
Quinone libres	+ +
Stérols et terpenoïdes	+ +
Anthocyanes	+ +

++ Strong presence of the compound; + presence of the compound; ± low presence of the compound.

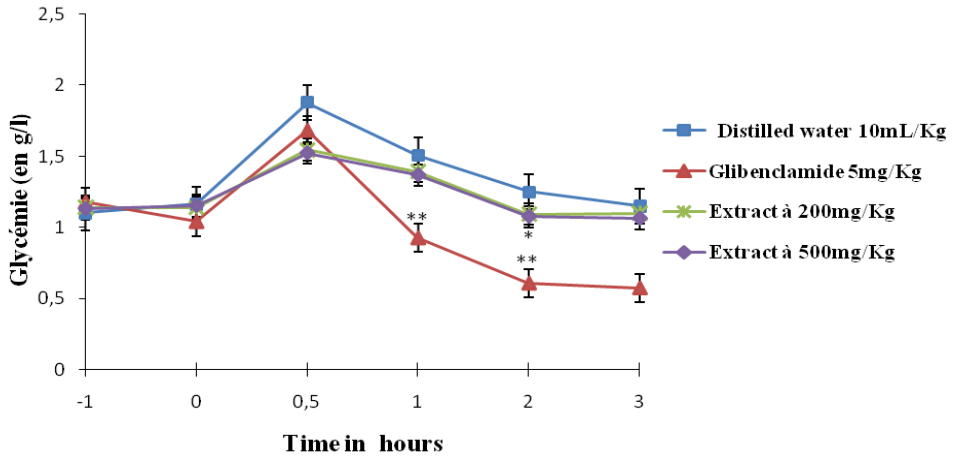

Figure 1: Evolution of blood glucose levels in normal rats challenged with oral glucose tolerance. *mean ± SD; * p<0,05 ; **p < 0,01, n = 5.*

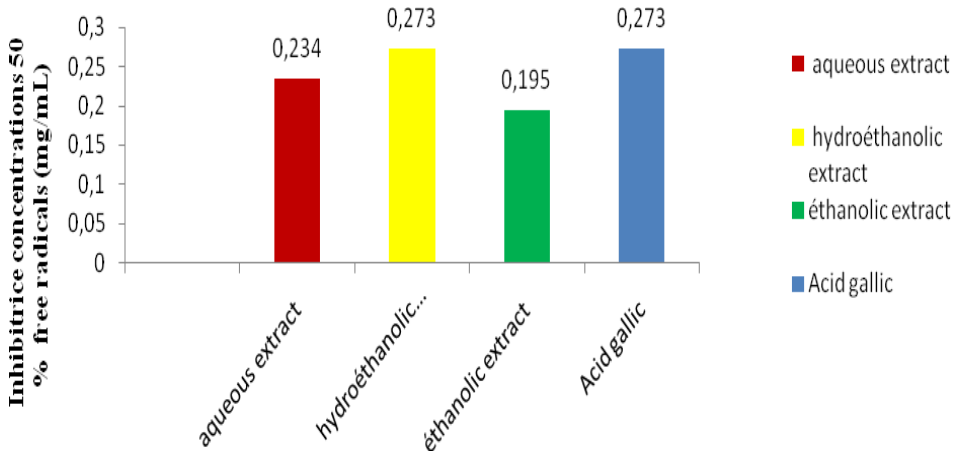

Figure 2: Inhibitory concentration of 50% free radicals of Maranthes glabra extracts with increasing polarity solvents (ethanolic extract, hydroethanolic extract and aqueous bark extract). Each value represents Mean ± SD, n = 3.

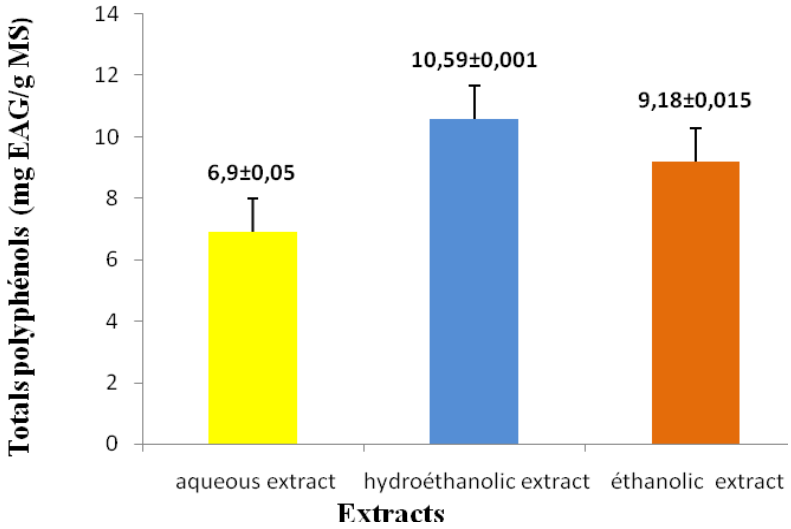

Figure 3: Variation of the total polyphenol contents of aqueous, hydroethanolic and ethanolic extracts of Maranthes glabra (Mean±SD).

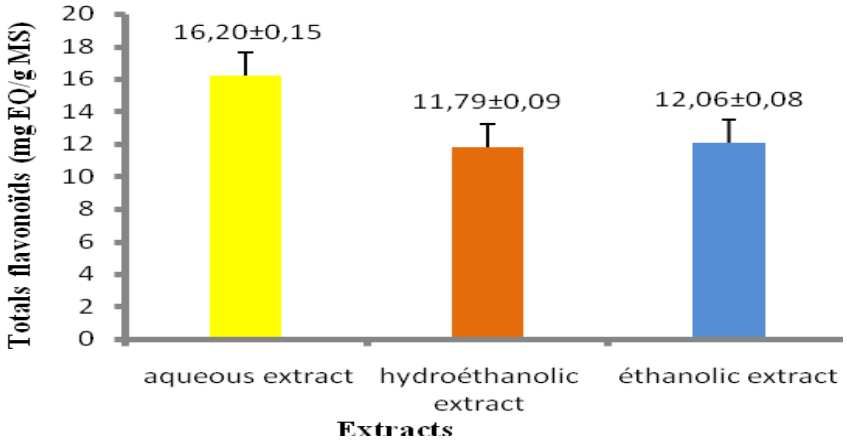

Figure 4: Variation of the total flavonoid contents in the aqueous, hydroethanolic and ethanolic extract of Maranthes glabra. (Mean ± SD, n = 3).

DISCUSSION

M. glabra has been used traditionally in Congolese folk medicine to treat several diseases including type II diabetes. The present study was designed, mainly, to evaluate the potential of the antidiabetic activity and to explain the potential mechanism of *M. glabra* aqueous extract in STZ-induced diabetic rats.

The results obtained concerning effects of the aqueous bark extract of M. glabra on basal blood glucose level show a significant decrease basal blood glucose level in normal rats extract-treated in comparing with rats distilled water-treated group. Indeed, at high dose of aqueous extract (500 mg / kg) the decrease was significant from the second hour ($p < 0.05$) compared to the controls distilled water-treated. These results could be explained probably by effects of aqueous extract of M. glabra on the Glut-2 glucose transporter as shown by June (2009). Similar results were obtained by Marhoune and Boulebtina (2017) and Ampa (2014) on leaves extract of *Rubus fructicosus* and *Trilepisium madagascariense* respectively.

Oral glucose tolerance assays revealed a hyperglycemia in rats one hour after treatment with blood glucose exceeding 1.55 g / l. This hyperglycemia was expressed mainly in the control rats treated with distilled water. The rats treated with glibenclamide and aqueous extract were showed lower peaks of blood glucose. The aqueous extract of Maranthes glabra ated the ability to protect animals against hyperglycemia. It is noted that the activity of the aqueous extract of Maranthes glabra was dose-dependent. The anti-hyperglycemic activity have been present from the second hour after extract administration for both extract concentrations studied. But this blood glucose level reduction was much more marked in the rats treated with 500 mg / kg. These results are similar to those of Abdallah, 2010; Meriem, 2015. These results suggest that the antidiabetic activity of the aqueous extract of *Maranthes glabra* could probably be attributed to the flavonoids that would be present in this extract as suggested Vitor et al., (2004); Spencer et al. (2004); Pincemail et al. (2007); Spinas, (2001); Stalikas, (2007); Olagbende-Dada et al. (2011), Nwachukwu et al. (2014), N'daye et al., (2015). Indeed, the antihyperglycaemic power of flavonoids has been reported by many authors such as Bakoma et al., (2012) with aqueous extracts of the roots of *Bridelia ferruginea* and Ampa et al., (2018) with the aqueous extract of seeds of *Strychnos camptoneura*. Also, the work of Jung et al., (2006) on citrus showed that flavonoids could have antihyperglycemic properties by acting on the enzymatic activity involved in the hepatic metabolism of glucose. In addition, flavonoids, terpenes, alkaloid, saponins and tanins act by improving the body's sensitivity to insulin, which reduces the incidence of type 2 diabetes (Ndomou et al., 2014 ; Kambouche et al., 2009). Thus, saponins, steroids, tannins, terpenes characterized in the barks of M. glabra would probably act in synergy with pancreatic metabolism by regulating hypo and hyperglycemia blood glucose levels to normal, which would justify the antidiabetic properties of this plant extract (Alberti and Zimmer, 1998, Akbarzadeh et al., 2007;). These bioactive substances would increase the ability of peripheral tissues to utilize glucose and stimulate insulin secretory pathways by acting on insulin receptors (Deina et al., 2003, Leduc et al. 2008, Bakoma et al., 2012, Belaich and Boujraf, 2016, Kim et al., 2016, Lavle and Shukia, 2016).

However, the antidiabetic effects of aqueous extract of M. glabra were slightly moderate at 200 mg/kg by comparison with those Glibenclamide used as reference drug. Aqueous extract at 500 mg/kg was more effective than glibenclamide in the first three hours following drug administration.

These antidiabetic properties are similar to those carried out on plant extracts by Aho (2002), Ampa et al. (2013); Ampa et al. (2018).

Also, we know that the metabolic disorders caused by diabetes generate free radicals that can destroy the pancreatic cells, which would aggravate its dysfunction (Muanda, 2010, Manallah et al., 2012 N'dzila et al., 2015, Ngouono, 2015). And, the antioxidant activity of bark extracts was assessed by DPPH free radical-scavenging *in vitro* antioxidant assays and showed that the extract exhibited a significant antioxidant property. Indeed, the results obtained show that the minimum concentrations which inhibit 50% of the free radicals are respectively 0.195 ± 0.001 mg / ml for the ethanolic extract, 0.234 ± 0.003 mg / ml for the aqueous extract and gallic acid and 0.273 ± 0.001 mg / ml for the hydroethanolic extract. We noted that the ethanolic extract of the bark extract of Maranthes glabra has a strong anti-free radical activity with an IC 50 of 0.195 ± 0.001 mg / ml lower approximating that of gallic acid which is the reference drug. While the IC50 of the hydroethanol extract, it is the least effective because of its higher inhibitory concentration (0.273 ± 0.001 mg / ml). Indeed, the lower the IC50, the higher the plant has a high antioxidant potential (Muanda, 2010, Manallah et al., 2012 N'dzila et al., 2015, Okiemy et al., 2016). The polyphenols and flavonoids contained in these extracts are therefore responsible for this antioxidant activity. The studies of Manallah et al., 2012, showed the correlation between the IC50 and the polyphenols and flavonoids content. These compounds are known to be absorbers and neutralize the oxygenated derivatives by reducing the metabolic disorders caused by diabetes.

The phytochemical screening of the barks of *M. glabra* showed that the plant is rich in tannins, flavonoïds, terpenes and steroids followed by a quantification of phenolic compounds and revealed significant levels of polyphenols in the bark extracts. Also, antidiabetic properties observed would probably due in part in the neutralization of free radicals (Epa 2015 ...).

CONCLUSION

This study showed that the barks of Maranthes glabra at 200 and 500 mg / kg have antidiabetic and antioxidant properties that would justify the use of this plant in traditional medicine. In fact, the aqueous extract significantly reduces the blood glucose level of normal rats and rats subjected to permanent hyperglycemia by treatment with streptozotocin. It is interesting to note that the dose of 500 mg / kg was more effective than 200 mg / kg. Also, we noted that the bark extracts of this plant are reservoirs of antioxidants capable of being used for the fight against free radicals because of the low IC 50 values constated, and have a high content of total polyphenols.

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