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PHYTOCHEMICAL COMPOSITION AND HEPATOPROTECTIVE ACTIVITIES OF THE TOTAL AQUEOUS EXTRACT OF *Phyllanthus muellerianus* LEAVES IN DIABETIC RATS

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ABSTRACT
The African populations in general and ivorian in particular use the plants for their health problems. The objective of this work is to study the phytochemical composition and the hepatoprotective activities of the total aqueous extract of *Phyllanthus muellerianus* in diabetic rats. The different chemical groups have been demonstrated in the aqueous total extract by their characteristic reactions. Hepatoprotective activities total aqueous extract of *Phyllanthus muellerianus* was evaluated in Wistar rats during experimental streptozotocin induced diabetes mellitus. Glyceamia and transaminases (ASAT and ALAT) were evaluated after treatment of rats with total aqueous extract *Phyllanthus muellerianus* and Glucidoral®, a reference antidiabetic agent. The results show that the total aqueous extract of *Phyllanthus muellerianus* is very rich in polyphenols, rich in alkaloids and terpenes and moderately rich in flavonoids and quinones, does not contain tannins and saponosides, whereas blood glucose, transaminases and total bilirubin have decreased significantly. Then normalized in diabetic rats treated with total aqueous extract *Phyllanthus muellerianus*. The same results were obtained with Glucidoral®. Conclusion: The total aqueous extract *Phyllanthus muellerianus* contains the major chemical groups, decreases and normalizes blood glucose, serum transaminase levels, and total bilirubin in diabetic rats. It could play a hepatoprotective role and justify its use in traditional medicine in the treatment of liver diseases.

KEYWORDS: *Phyllanthus muellerianus*, hepatoprotective, transaminases, total bilirubin.

I. INTRODUCTION
Diabetes is a chronic condition that occurs when the pancreas does not produce enough insulin or when the body is unable to effectively use the insulin it produces. Diabetes is characterized by elevated glucose levels in the blood or hyperglycemia. According to the World Health Organization[21], there is diabetes when fasting blood glucose is greater than or equal to 1.26 g / L twice. Diabetes is a disease considered by WHO as an epidemic whose prevalence has increased dramatically in recent years. In Côte d'Ivoire, the prevalence rate in the general population, which was 5.7% in 2014, increased to 7.5% in 2016.[3] Diabetes is a major cause of liver cell destruction.

In modern societies, the pharmaceutical industry has managed to develop a whole arsenal of therapy to fight against this disease. In traditional, non-industrialized societies, the medicines available to populations affected by this condition are still not accessible because of their often high cost. Faced with this desperate situation, more and more sick people are moving towards medicinal plants that are more accessible, efficient and within reach of their purse. Among these plants, *Phyllanthus muellerianus*, a species of African flora, is used in traditional medicine in Africa to treat intestinal disorders, severe dysentery, anemia and toothache.

In this work, we will study the hepatoprotective activities of the total aqueous extract of *Phyllanthus muellerianus* in streptozotocin diabetic rats.

II- MATERIALS AND METHODS

II.1- Plant material

The *Phyllanthus muellerianus* leaves used were collected in Yakassé Mé in the department of Adzopé (Côte d'Ivoire). Harvests were made in the month of September 2016. Authentication of this plant was made at the National Center of Floristry (CNF) of the University Felix HOUPHOUET-BOIGNY Abidjan-Cocody where it is registered under the number 1568 of October 18, 1985.

II.2- Animal material

White albino rats, male Rattus norgevicus, strain Wistar, genus Musa, were used for this study. These animals were fed with the pellets. They weigh between 162 and 182 g and are two to three months old.

II.3- Preparation of the total aqueous extract of *Phyllanthus muellerianus*

The total aqueous extract of *Phyllanthus muellerianus* was prepared according to the method described by Guédé-Guina et al.[9] According to this method, 100 g of *Phyllanthus muellerianus* powder were dissolved in two liters (2L) of distilled water. The aqueous mixture was stirred for 48 h at 80° C using a magnetic stirrer type IKA-MAG RCT. The homogenate obtained was filtered successively twice on hydrophilic cotton, then on büchner with Whatman 3 mm filter paper. The filtrate obtained was evaporated under reduced pressure at a temperature of 50 ° C using a Buchi rotary evaporator. The brown evaporate obtained was the total aqueous extract of *Phyllantus muellerianus*.[9]

II.4-Phytochemical study

The phytochemical study consisted in characterizing the chemical groups present in the total aqueous extract of *Phyllanthus muellerianus* and likely to possess biological activities. Thus, chemical groups such as alkaloids, polyphenols, flavonoids, quinones, tannins, saponosides, polyterpenes and sterols have been sought by the methods described by Trease and Evans.[20]

II.4.1- Search for alkaloids

The search for alkaloids was carried out using Dragendorff and Bouchardat reagents. These two reagents make it possible to highlight the alkaloids but differ in the coloration that the alkaloids take. Alkaloids complex with heavy metals such as bismuth, iodine, mercury and tungsten, and as salts. Thus, they form an orange precipitate with the Dragendorff reagent and a reddish-brown precipitate with that of Bouchardat.[20]

II.4.2- Search for polyphenols

The polyphenols were evidenced by the reaction with ferric chloride. Phenols form with ferric chloride (FeCl3) a blue-blackish or green precipitate. The appreciation of this coloration is made with respect to the blue-blackish and green colors printed on ream paper.[20]

II.4.3- Search for tannins

The Stiasny reagents (hydrochloric formalin solution) revealed the catechin and gallic tannins. The catechin tannins, in condensed form (non-hydrolyzable), are precipitated in large flakes by heating followed by cooling. The gallic tannins, which are in the form of hydrolyzable glycosides, are hydrolysed after the addition of sodium acetate and then form a blue-blackish precipitate in the presence of ferric chloride.[20]

II.4.4- Search for flavonoids

Flavonoids were evidenced by the so-called cyanidin reaction. In alcoholic solution, the flavonic derivatives are colored differently according to their chemical structure. Thus, the flavones give an orange coloring, the flavanols are colored red and the flavonones are red-purplish.[20]

II.4.5- Search for terpenes and sterols

The search for terpenes and sterols was carried out by the reaction of Libermann. Sterols and terpenes react with sulfuric acid in the presence of acetic anhydride to form a purple or purple colored complex, turning blue then green. This analysis is done compared to cholesterol as a control. The reagent of Libermann was used for this demonstration.[20]

II.4.6- Search for Quinones

The demonstration of the quinonic substances was carried out using the Borntraeger reagent (ammonia diluted by half). Quinones form with alkaline substances such as ammonia and sodium hydroxide, a complex colored red to purple. The characterization reaction is preceded by acid hydrolysis in order to demonstrate the total quinone substances (free and combined quinone substances).[20]

II.4.7- Search for saponosides

The saponosides were highlighted by the foam production test. In aqueous solution, the saponosides have a very high foam index. They produce a large and persistent foam.[20]

II.5-Induction and treatment of experimental diabetes

A total of 40 rats, mean weight 172.80 ± 0.80 g, were used for this study. The animals were divided into two groups. A group of 4 rats constituting the control group received distilled water and a group of 36 rats constituting the test group received streptozotocin (STZ). Permanent hyperglyceamia was induced in animals by intraperitoneal administration of a single dose of 10 mg / kg bw in solution in 0.1 M citrate buffer pH 4.5. Administration is daily and blood glucose is assessed from day D0 to day D21 using a strip glucose meter. Hyperglyceamia was detected after 6 days and rats with blood glucose level greater than or equal to 1.75 mg / L are considered diabetic after 21 days. These animals now called diabetic group are included in our study. At the end of these 21 days of induction, 24 diabetic rats were

selected, divided into six groups with a group that received no treatment and five (5) that were treated with different doses of *Phyllanthus muellerianus* and glucidoral ®. 1 ml of each dose was administered daily and regularly to the sick animals by gavage using a cannula. The treatment was done for 7 days. The distribution of the groups and the treatments were carried out as follows (Table 1).

Table 1: Doses of the aqueous extract of *Phyllanthus muellerianus* and glucidoral® administered during the treatment of diabetes.

Groups	Designation	The doses administered mg/kg bw
1	Non-diabetic control	No dose used
2	Diabetic not treated	No dose used
3	Diabetic treated with aqueous extract	100
4	Diabetic treated with aqueous extract	200
5	Diabetic treated with aqueous extract	300
6	Diabetic treated with glucidoral®	10
7	Diabetic treated with glucidoral®	20

After seven (7) days of treatment, the blood was removed and centrifuged. Serum collected was used for assay, glucose, transaminases (ASAT and ALAT) and total bilirubin.

II.6- Determination of blood glucose level

Glyceamia was assayed according to Tietz's enzyme method.[19] It consists in oxidizing glucose by the enzyme glucose oxidase with production of gluconic diacid and dihydrogen peroxide (H_2O_2).

II.7- Activities Of Transaminases

II.7.1-Activity of Aspartate Aminotransferase (ASAT)

The activity of Aspartate Aminotransferase (ASAT) was evaluated according to the method of Karmen, modified by Henri Bergmeyer[5,10,13]; and according to the recommendations of the International Federation of Clinical Chemistry (FICC) that use the Karmen / Bergmeyer technique of coupling malate dehydrogenase and reduced nicotinamide dinucleotide (NADH).[5]

II.7.2- Activity of Alanine Aminotransferase (ALAT)

The activity of Alanine Aminotransferase was evaluated according to the method recommended by the International Federation of Clinical Chemistry.[6]

II.8- Determination of total and direct bilirubin

Bilirubin is converted into azobilirubin stained with diazotized sulfanilic acid and measured photometrically. Two fractions are present in serum: bilirubin glucuronide and free bilirubin poorly bound to albumin. The first reacts directly in aqueous solution (direct bilirubin). Free bilirubin requires solubilization with dimethylsulfoxide (DMSO) to react (indirect bilirubin). In the determination of indirect bilirubin, direct bilirubin is also determined, the results represent total bilirubin. The intensity of the color formed is proportional to the concentration of bilirubin in the sample and is quantifiable spectrophotometer at a wavelength λ equal to 550 nm.

II.9- Statistical analysis

The statistical analysis of the values and the graphical representation of the data were carried out with Graph Pad Prism 5 software (Microsoft). The average value is accompanied by the standard error on the mean (mean ± SEM). The statistical analysis of the results was performed using the one-way analysis of variances (ANOVA) followed by the Tukey multiple comparison test. $P < 0.001$ is considered significant.

III-RESULTS

III.1- Phytochemical study

The results of the phytochemical study carried out on the aqueous total extract (ETA) of the leaves of *Phyllanthus muellerianus* are presented in Table II. The ETA of *Phyllanthus muellerianus* contains the polyphenols, alkaloids, terpenes, sterols, flavonoids and quinones in varying proportions. It does not contain saponosides and tannins (catechism and gallic).

Table 2: Phytochemical studies of the aqueous extract *Phyllanthus muellerianus.*

Chemical compounds	Aqueous extract
Alkaloids	++
Polyphenols	++
Catechin tannins	-
Gallic tannins	-
Flavonoids	+
Saponosides	-
Quinones	+
Terpenes	++
Sterols	++

(+): Present (++): Abundant (-): Absent

III.2- Evolution of the glyceamia of rats after injection of streptozotocin

The variation in blood glucose levels in healthy and diabetic rats is shown in Figure 1. Mean blood glucose levels in healthy rats were 0.72 ± 0.018 g / L. During diabetes, this blood glucose level varies significantly from 0.72 ± 0.018 g / L to 0.912 ± 0.10 g / L on the 5th

day, then to 2.13 ± 0.27 g / L on the 6th day, then to 3, 53 ± 0.01 g / L on the 14th day and finally 3.91 ± 0.01 g / L g / L on the 21st day.

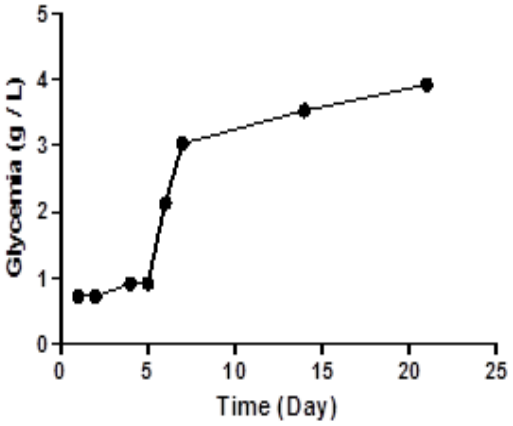

Figure 1: Evolution of blood glucose levels in rats in the test group after streptozotocin injection.

III.3-Determination of glyceamia after treatment

Figure 2 shows the glycemia of the rats after seven days of treatment with the total aqueous extract of *Phyllanthus muellerianus* and Glucidoral®. The average normal blood glucose value of the rats is 0.72 ± 0.018 g / L. This value increased significantly (P< 0.0001) with the induction of diabetes. It increased from 0.72 ± 0.018 g / L (control value) to 4.06 ± 0.04 g / L (value of untreated diabetic rats). Treatment of diabetic rats with the total aqueous extract *Phyllanthus muellerianus* at doses of 100, 200, and 300 mg / kg bw and Glucidoral® at doses of 10 and 20 mg / kg bw gave mean blood glucose values, respectively of 2.62 ± 0.06 g / L, 1.86 ± 0.13 g / L, 0.82 ± 0.08 g / L, 0.92 ± 0.05 g / L and 0.73 ± 0.03 g / L. This treatment significantly decreased (P< 0.0001) the glycemia of treated rats compared to that of untreated diabetic rats. But the blood glucose levels obtained after treatment with the total aqueous extract *Phyllanthus muellerianus* at a dose of 100 and 200 mg / kg bw remain extremely superior to that of non-diabetic rats. As for the blood glucose levels obtained with the total aqueous extract *Phyllanthus muellerianus* at a dose of 300 mg / kg / kg and Glucidoral® at a dose of 10 mg / kg bw, they are slightly higher than that of non-diabetic rats but there is no significant difference (P > 0.05). Treatment with the total aqueous extract *Phyllanthus muellerianus* at a dose of 300mg / kg bw and Glucidoral® at a dose of 20 mg / kg bw brought back the glycemia of treated rats to normal.

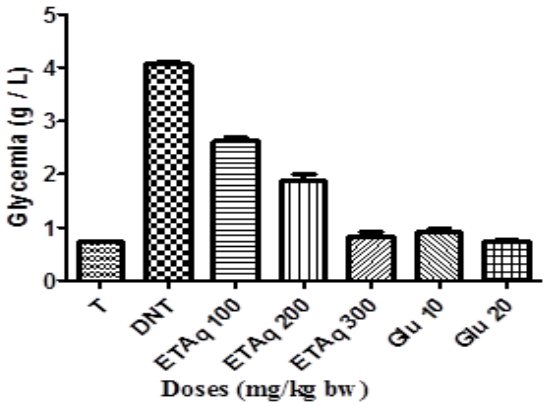

Figure 2: Effects of aqueous extract of *Phyllanthus muellerianus* and Glucidoral® on glyceamia in diabetic rats.

Data are expressed as mean ± SEM, (n = 4). T = Group of non-diabetic control rats, DNT = Group of untreated diabetic rats; ETAq= total aqueous extract of Phyllanthus muellerianus, ETAq 100 = Group of diabetic rats treated with ETAq at a dose of 100 mg / kg bw, ETAq 200 = Group of diabetic rats treated with ETAq at a dose of 200 mg / kg bw, ETAq 300 = Group of diabetic rats treated with ETAq at a dose of 300 mg / kg bw, Glu 10 = Group of diabetic rats treated with Glucidoral® at a dose of 10 mg / kg bw and Glu 20 = Group of diabetic rats treated with Glucidoral® at the dose 20 mg / kg bw.

III.4- III.4- Activities of transaminases

III.4.1- II.4.1- Case of Asparate Aminotransferase (ASAT)

Figure 3 shows ASAT activity of diabetic rats treated with the total aqueous extract of *Phyllanthus muellerianus* and Glucidoral®. The normal mean value of ASAT activity in rats is 145.60 ± 0.78 IU / L. This value increased significantly (P< 0.0001) with the induction of diabetes. It went from 145.60 ± 0.78 IU / L (control value) to 218.40 ± 1.62 IU / L (value of untreated diabetic rats). Treatment of diabetic rats with the total aqueous extract of *Phyllanthus muellerianus* at doses of 100, 200, and 300 mg / kg bw and Glucidoral® at doses of 10 and 20 mg / kg bw gave respectively mean ASAT activity of 178.70 ± 3.73 IU / L, 159 ± 3.98 IU / L, 150.40 ± 2.88 IU / L, 184.7 ± 5.28 IU / L and 181.1 ± 3.56 IU / L. This treatment significantly decreased the ASAT activity of the treated rats compared to that of the untreated diabetic rats. Only total aqueous extract of *Phyllanthus muellerianus* at a dose of 300 mg / kg bw, reduced ASAT activity slightly above normal, but there is no significant difference (P >0.05).

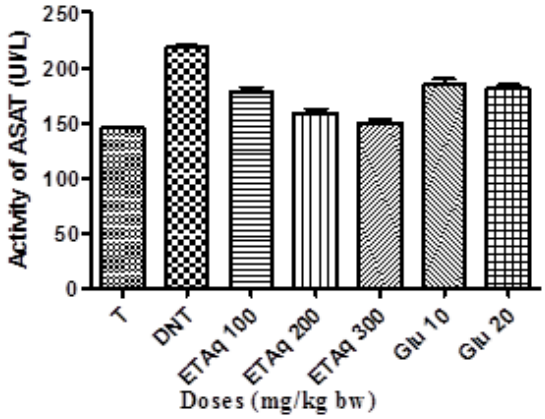

Figure 3: Effects of aqueous extract of *Phyllanthus muellerianus* and Glucidoral® on ASAT activity in diabetic rats.

Data are expressed as mean ± SEM, (n = 4). T = Group of non-diabetic control rats, DNT = Group of untreated diabetic rats; ETAq= total aqueous extract of Phyllanthus muellerianus, ETAq 100 = Group of diabetic rats treated with ETAq at a dose of 100 mg / kg bw, ETAq 200 = Group of diabetic rats treated with ETAq at a dose of 200 mg / kg bw, ETAq 300 = Group of diabetic rats treated with ETAq at a dose of 300 mg / kg bw, Glu 10 = Group of diabetic rats treated with Glucidoral® at a dose of 10 mg / kg bw and Glu 20 = Group of diabetic rats treated with Glucidoral® at the dose 20 mg / kg bw.

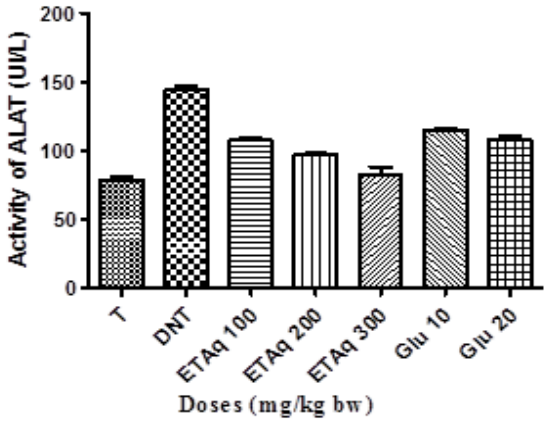

Figure 4: Effects of aqueous extract of *Phyllanthus muellerianus* and Glucidoral® on ALAT activity in diabetic rats.

Data are expressed as mean ± SEM, (n = 4). T = Group of non-diabetic control rats, DNT = Group of untreated diabetic rats; ETAq= total aqueous extract of Phyllanthus muellerianus, ETAq 100 = Group of diabetic rats treated with ETAq at a dose of 100 mg / kg bw, ETAq 200 = Group of diabetic rats treated with ETAq at a dose of 200 mg / kg bw, ETAq 300 = Group of diabetic rats treated with ETAq at a dose of 300 mg / kg bw, Glu 10 = Group of diabetic rats treated with Glucidoral® at a dose of 10 mg / kg bw and Glu 20 = Group of diabetic rats treated with Glucidoral® at the dose 20 mg / kg bw.

III.4.2- Case of Alanine Aminotransferase (ALAT)

Figure 4 shows the ALAT activity of diabetic rats treated with the aqueous extract of *Phyllanthus muellerianus* and Glucidoral®. The normal mean value of ALAT activity in rats is 78.55 ± 2.10 IU / L. This value increased significantly (P< 0.0001) with the induction of diabetes. It went from 78.55 ± 2.10 IU / L (control value) to 144.4 ± 2.71 IU / L (value of untreated diabetics). Treatment of diabetic rats with the aqueous extract of *Phyllanthus muellerianus* at doses of 100, 200, and 300 mg / kg bw and Glucidoral® at doses of 10 and 20 mg / kg bw gave respectively mean ALAT activities of 107.6 ± 1.89 IU / L, 97.51 ± 0.59 IU / L, 82.29 ± 5.68 IU / L, 115.30 ± 0.88 IU / L and 108 ± 2.15 IU / L. This treatment significantly decreased the ALAT activity of the treated rats compared to that of the untreated diabetic rats. Only the aqueous extract of *Phyllanthus muellerianus* at a dose of 300 mg / kg bw reduced ALAT activity slightly above normal, but there is no significant difference (P >0.05).

III.5- Determination of total bilirubin

Figure 5 shows the total bilirubin concentrations of diabetic rats treated with the total aqueous extract of *Phyllanthus muellerianus* and Glucidoral®. The normal mean value of the total biliubin concentration of the rats is 5.84 ± 0.22 µmol / L. This value increased significantly (P< 0.0001) with the induction of diabetes. It increased from 5.84 ± 0.22 µmol / L to 28.60 ± 0.27 µmol / L (value of untreated diabetic rats). Treatment of diabetic rats with the total aqueous extract *Phyllanthus muellerianus* at 100, 200, and 300 mg / kg bw and Glucidoral® at 10 and 20 mg / kg bw gave mean concentrations of total bilirubin, respectively of 13.65 ± 0.15 µmol / L, 11.65 ± 0.7 µmol / L, 7 ± 0.18 µmol / L, 13.30 ± 0.26 µmol / L and 12.74 ± 0.28 µmol /L. This treatment significantly lowered the total bilirubin concentration of the treated rats compared to that of the untreated diabetic rats. But none of these doses reduced the concentration of total bilirubin in treated rats to normal.

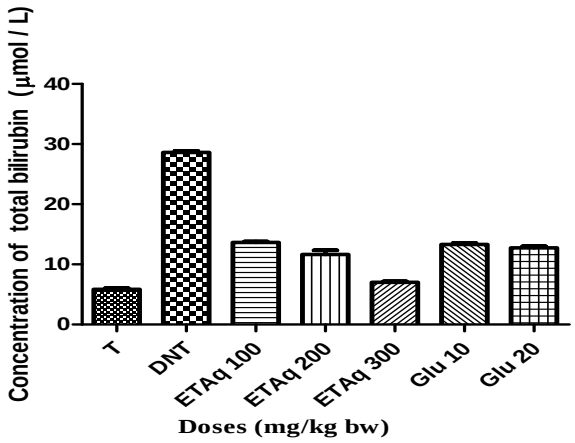

Figure 5: Effects of the aqueous extract of *Phyllanthus muellerianus* and Glucidoral® on the total bilirubin concentration of diabetic rats.

Data are expressed as mean ± SEM, (n = 4). T = Group of non-diabetic control rats, DNT = Group of untreated diabetic rats; ETAq= total aqueous extract of Phyllanthus muellerianus, ETAq 100 = Group of diabetic rats treated with ETAq at a dose of 100 mg / kg bw, ETAq 200 = Group of diabetic rats treated with ETAq at a dose of 200 mg / kg bw, ETAq 300 = Group of diabetic rats treated with ETAq at a dose of 300 mg / kg bw, Glu 10 = Group of diabetic rats treated with Glucidoral® at a dose of 10 mg / kg bw and Glu 20 = Group of diabetic rats treated with Glucidoral® at the dose 20 mg / kg bw.

IV-DISCUSSION

The phytochemical study of *Phyllanthus muellerianus* revealed an absence of saponosides and tannins (catechins and gallic) in the aqueous extract of the leaves of this plant. However, this study revealed the presence of alkaloids, polyphenols, flavonoids, quinones, terpenes and sterols in the leaves of *Phyllanthus muellerianus*. These results are in agreement with those of Ben-Bala[4] who showed the presence of flavonoids, alkaloids and quinones in the leaf extract of *Phyllanthus muellerianus*.

The results of this work showed a significant increase in blood glucose levels in streptozotocin-diabetic rats. This increase in glyceamia during diabetes is due to streptozotocin, which causes a selective cytotoxic effect of β-cells in islets of Langerhans.[2,7,18] In contrast, treatment with aqueous extract of *Phyllanthus muellerianus* at doses of 100, 200 and 300 mg / kg bw and Glucidoral® at 10 and 20 mg / kg bw of diabetic rats resulted in a significant reduction in blood glucose. The aqueous extract *Phyllanthus muellerianus* at a dose of 300 mg / kg bw and Glucidoral® at a dose of 20 mg / kg bw normalize blood glucose levels in diabetic rats. This decrease of glyceamia of diabetic rats by the aqueous extract of *Phyllanthus muellerianus* would be due to the presence of flavonoids[15,17] Indeed, flavonoids improve the sensitivity of cells, which reduces the index of type 2 diabetes.[8,14] Glucidoral®'s reduction in glucose levels in diabetic rats is due to its active substance, Carbutamide, which belongs to the sulphonamide hypoglycaemic family.

The second part of this work deals with the effect of the total aqueous extract of *Phyllanthus muellerianus* on transaminase activities (ASAT and ALAT) and total bilirubin of streptozocin-diabetic rats in comparison with that of Glucidoral®. Diabetes induced in rats by 10 mg / kg bw Streptozocin is accompanied by strong disturbances in biochemical parameters. Indeed, the results showed that diabetes caused a significant increase in transaminase activities (ASAT and ALAT) and total bilirubin. In contrast, treatment with aqueous extract *Phyllanthus muellerianus* at doses of 100, 200 and 300 mg / kg bw and Glucidoral® at 10 and 20 mg / kg bw of diabetic rats resulted in a significant reduction of all the parameters mentioned hereinbefore. The total aqueous extract of *Phyllanthus muellerianus* at a dose of 300 mg / kg bw normalizes transaminase activities (ASAT and ALAT) and glucose levels. As for Glucidoral® at a dose of 20mg / kg bw, it normalizes blood glucose.

The transaminases that are Aspartate Aminotransferases (ASAT) and Alanine Aminotransferase (ALAT) are intracellular enzymes present in the liver. These are good indicators of liver function.[11] A significant and persistent rise in the serum concentration of these enzymes is an indicator of a cellular lesion that causes them to pass into the blood.[12] Bilirubin is a yellow pigment present in the bile and in small amounts in the blood. An accumulation of bilirubin in the body results in jaundice. High bilirubin may be a sign of hepatitis. This study also showed a significant increase in serum levels of these transaminases and total bilirubin in diabetic rats. However, the treatment of these diabetic animals with the aqueous extract of *Phyllanthus muellerianus* and with Glucidoral® significantly reduced and even lowered the serum levels of these transaminases to their normal values. Diabetes causes liver cell damage and is thought to be responsible for impaired liver function. The aqueous extract of *Phyllanthus muellerianus* as well as Glucidoral® would act to protect the liver from any lesion. The decrease in transaminase activity is thought to be due to the polyphenols that would be associated with many physiological processes such as cell growth.[1,16]

V-CONCLUSION

The objective of this work is to make a phytochemical study and determine hepatoprotective activities of the aqueous extract of *Phyllanthus muellerianus* in rats made diabetic with Streptozotocin.

The phytochemical study of *Phyllanthus muellerianus* confirmed by thin layer chromatography revealed an absence of saponosides and tannins (catechins and gallic) in the aqueous extract of the leaves of this plant. However, this study revealed the presence of alkaloids, polyphenols, flavonoids, quinones, terpenes and sterols

in the leaves of *Phyllanthus muellerianus*. These chemical elements would be at the origin of the therapeutic virtues of the leaves of *Phyllanthus muellerianus*.

Administered by intraperitoneal injection, Streptozotocin, at 10 mg / kg bw, causes in rats, diabetes. This diabetes causes a serious disturbance of the biochemical parameters which are the glycemia, the transaminases (ASAT and ALAT) activies and the total bilirubin concentration. Diabetes causes a significant increase in serum glucose concentration, transaminases (ASAT and ALAT) and total bilirubin.

Treatment with aqueous extract of *Phyllanthus muellerianus* at doses of 100, 200 and 300 mg / kg bw and Glucidoral® at 10 and 20 mg / kg bw diabetic rats decreases biochemical parameters namely glycemia, transaminases (ASAT and ALAT) and total bilirubin. The aqueous extract of *Phyllanthus muellerianus* at the dose of 300mg / kg bw normalizes glucose levels, transaminases (ASAT and ALAT). As for Glucidoral® at 20 mg / kg bw, it normalizes blood sugar. The aqueous extract of *Phyllanthus muellerianus* at the dose of 300mg / kg bw normalizes glucose levels, transaminases (ASAT and ALAT) and significantly reduces the concentration of total bilirubin. This extract would act by protecting the liver from any lesion.

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