*ejpmr, 2018,5(10), 138-142*

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

# EFFECTS OF THE AQUEOUS EXTRACT OF THE STEMS BARK OF *STRYCHNOS CAMPTONEURA* GILG & BUSSE (LOGANIACEAE) ON THE FACTORS OF CARDIOVASCULAR RISK ETHANOL 20 %- INDUCED IN RAT

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**Article Received on 14/08/2018** **Article Revised on 04/09/2018** **Article Accepted on 25/09/2018**

## ABSTRACT

Currently, the alcoholic drinks are consumed abundantly in the big cities. Thus, the present survey has for objective to value the effects of the aqueous extract of the stems bark of *Strychnos camptoneura* on the cardiovascular factors of risk ethanol 20 % -induced in rat. The rats have been dealt daily with a solution of ethanol 20 % to 3.76 g/kg, orally during nine weeks concomitantly with the extract to the doses of 300 and 600 mg/kg/j, orally and water distilled to 10 ml/kg/j, per bone. The rats of the share witness had received the distilled water solely (10 ml/kg/j, orally). To the term of the nine weeks, the cardiovascular parameters of risk have been measured. The gotten results show that this excerpt opposes the gain weight, to the increase of the masses of the heart, the left ventricle and the report ventricle - bodily mass, to the high triglyceridemia and to the high blood sugar provoked by the ethanol 20 % whereas it is without effects on the concentration blood of total cholesterol and the creatinine. These results suggest that this excerpt corrects the cardiovascular factors of risk misled by the overcharge éthanolique 20 % at the rat. An ulterior survey on the parameters of stress oxidative of the organ seems useful.

**KEY WORDS:** Ethanol 20 %, *Strychnos camptoneura*, weight, high triglyceridemia, the high blood sugar.

## INTRODUCTION

Within of numerous populations, the fact to consume the alcoholic drinks became a food or cultural habit well anchored at a big of people. At Brazzaville (Congo), Kimbally Kaky and al., (2004) showed that the global level of consumption of the alcoholic drinks is of 61.1 %; the regular drinker percentage is 35.1 %. This alcoholic poisoning is a factor of risk of the cardiovascular illnesses (CVI) and is to the origin of other factors of risk of the CVI (overweight, dyslipidemia, diabetes, left ventricular hypertrophy, renal insufficiency, arterial hypertension…) (Kiritze-Topor, 2011). Most means discovered by the man to treat the pathologies are of plant origin. So, we were interested in this present survey in a plant of the Congolese pharmacopeia: *Strychnos camptoneura* (*S. camptoneura*) Gilg & Busse, belonging to the family of the Loganiaceae. Indeed, the stems bark of the *S. camptoneura* are used in traditional medicine against several pathologies (Morabandza and al., 2016a). The chemical survey of the stems bark of this species revealed the presence of numerous chemical families: the anthraquinones, the flavanals/flavonols and the tannins endowed of potentialities antioxidants (Morabandza and al., 2016a) and well-known efficient in the prevention and the cardiovascular illness treatment (Gazola, 2004). The pharmacological studies revealed the properties against microbes and anti-inflammatory (Morabandza and al., 2016b) and against pain and antipyretic (Morabandza and al., 2016c). The objective of this survey is to value the effects of the aqueous extract of the stem bark of *S. camptoneura* on the factors of cardiovascular risk by the overcharge éthanolique 20 % induced subchronique in Wistar rat.

## MATERIAL AND METHODS

### Plant material

The stems bark of *S. camptoneura*, harvested in the Department of the Cuvette-Ouest (Congo), have been used. The samples of the leaves of this plant have been authenticated to the National institute of Research in Exact and Natural Sciences (Brazzaville - Congo), and recorded under the n° 271. The peels have been cut in small pieces with the help of a knife then dried to the ambient temperature (28 ± 1 °C) to the Laboratory.

### Animal material

The Wistar rats female of weight between 140 and 180 g and aged of 16 at 18 weeks have been used. These rats

have been provided by the Faculty of the Sciences and Techniques of the university Marien Ngouabi. They have been maintained under a cycle of 12 h of light and 12 h of obscurity to the ambient temperature of 28 ± 1 °C with a free access to a standard food (composition is given in the table 1) and to the water of the faucet.

**Preparation of the aqueous extract of the stems bark of the *Strychnos camptoneura***

The aqueous extract of the stems bark of *Strychnos camptoneura* has been prepared by steeping 50 g of powder in 500 mL of water distilled during sixty twelve (72) hours, under magnetic agitation. Macerated it gotten has been filtered three (3) time with the help of the absorbent cotton then, the filtrate has been evaporated with the help of a ball heats to the temperature of 70 °C.

**Preparation of the ethanol 20 %**

The ethanol 20 % has been prepared while mixing 100 mL of ethanol 95° with 381.90 mL of water distilled according to the correspondence of Gay Lussac table.

**Induction of the cardiovascular factors of risk and treatment of the rats with the aqueous extract of the stems bark of *Strychnos camptoneura***

The cardiovascular factors of risk have been induced as using the protocol describes by Mini and Rajamohan, (2013). So, four groups of eight rats each has been constituted and treaties during (9) weeks of the following manner:

- group 1 : water distilled (10 mL/kg/day, p.o) ;
- group 2 : ethanol 20 % (3.76 g/kg/day, p.o) + water distilled (10 ml/kg/day, p.o) ;
- group 3 : ethanol 20 % (3.76 g/kg/day, p.o) + aqueous extract of *S. camptoneura* (300 mg/kg/day, p.o) ;
- group 4 : ethanol 20 % (3.76 g/kg/day, p.o) + aqueous extract of *S. camptoneura* (600 mg/kg/day, p.o).

**Evaluation of the effects of the aqueous extract of the stems bark of *S. camptoneura* on the cardiovascular factors of risk**

***Effects on the evolution of the weight***

During the nine (9) weeks of the treatment, the bodily weight of the rats has been measured at the end of every week.

***Effects on the relative masses of kidneys, of heart and of report left ventricle - bodily mass***

To the term of the treatment, the animals asleep to the diethyl ether have been sacrificed then by decapitation, the arteriovenous blood has been collected in tubes dry "VACUTESTS ". After dissection of the rats, the noble cardiovascular risk organs (kidneys and heart) have been removed and their measured mass with the help of a balance to precision. The left ventricle ridded of the right ventricle and auricles has been weighed and its report with the mass of the heart calculated in order to determine the left ventricular index (L.V.I).

***Effects on the biochemical parameters of risk of the cardiovascular illnesses***

Arteriovenous blood collected in the tubes dry "VACUTESTS" has been centrifuged to 2500 tours/min during five (5) minutes with the help of a centrifuge of type Hospitex Diagnoses SRL Centrifuga C-60. The gotten serum was removed and placed in tubes eppendorff for the dosage of the biochemical parameters of risk of the cardiovascular illnesses (triglyceride, blood sugar, total cholesterol and creatinine).

**RESULTS**

**Effects of the aqueous extract of the stems bark of *Strychnos camptoneura* on the weight evolution**

To the term of nine (9) weeks, in rats treated to the ethanol 20 % more the aqueous extract of the stem bark of *S. camptoneura* (300 and 600 mg/kg), the relative weight of the rats is 123.28 ± 4.02 ($p < 0,001$) and 127.94 ± 4.38 ($p < 0.001$) respectively, against 145.21 ± 9.04 % in rats treated by ethanol 20 % (figure 1). The percentage of inhibition of the increase weight of the rats treated by the aqueous extract of the stems bark of *S. camptoneura* (300 and 600 mg/kg) is respectively of 15.10 and 11.89 %.

**Effects of the aqueous extract of the stems bark of *Strychnos camptoneura* on the masses of the heart and of the left ventricle, and on the report left ventricle - mass of the heart**

The table 2 shows that the relative masses of the heart, of the left ventricle and of the report left ventricle - mass of the heart is raised meaningfully at the rats treated to the ethanol 20 % more water distilled in relation to the rats witnesses (water distilled); the increases of the masses of 20.40; 3.65; 43.98 and 43.48 % are noted. However, it is noted at the rats treated to the aqueous extract of the stems bark of *S. camptoneura* (300 and 600 mg/kg) in addition to the ethanol 20 %, a reduction of these masses in relation to those of the rats treated to the ethanol 20 % more the water distilled.

**Effects of the aqueous extract of the stems bark of *Strychnos camptoneura* on the biochemical parameters**

At the rats having received the ethanol 20 % more the aqueous extract of the stem bark of *S. camptoneura*, the concentrations of blood triglycerides and glucose are reduced in relation to those of the rats treated to the ethanol 20 % (table 3). For the triglycerides, the percentage of reduction is of 64.86 % at the rats treated with this extract to 300 mg/kg. The percentages of reduction are of 44.60 and 46.01 % for the blood sugar respectively to the doses of 300 and 600 mg/kg of this extract. However, concerning the total cholesterol and the creatinine, the variations non meaningful are observed at the rats treated to the ethanol 20% more the aqueous extract of the stems bark of *S. camptoneura* (300 and 600 mg/kg) in relation to the rats treated to the ethanol 20 % (table 3).

**Table 1: Food composition.**

| Foods | Quantity (kg) |
|---|---|
| Flour of soy | 2.5 |
| Cornflour | 2.5 |
| Flour of wheat | 2.5 |
| Flour of fishes smoked | 2 |
| Flour of peanut | 0.75 |
| Salt | 0.01 |
| Oil of palm | 50* |
| Water of faucet | 800* |

*mL

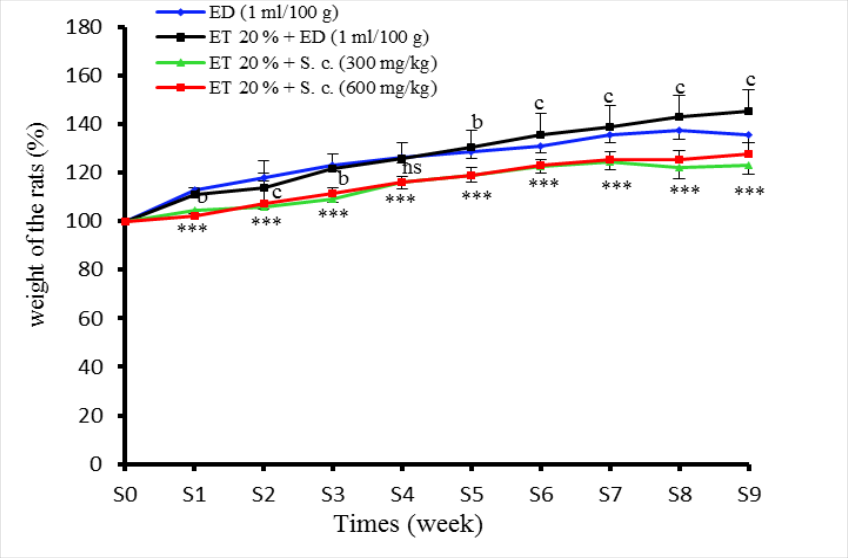


**Figure 1: Variation of the relative weight at the rats according to the time.**

ED = water distilled; ET = Ethanol à 20 %; S. c. = *Strychnos camptoneura*; S = week. Every point is a mean ± ESM, with n = 8; [b] p <0.001; [c] p < 0.001 meaningful difference in relation to the witness (distilled water); *** p < 0.001 meaningful difference in relation to the witness (ethanol + distilled water).

**Table 2: Variation of the relative masses of the organs of the rats.**

| Organs (mg/100 g) | Treatment | | | |
|---|---|---|---|---|
| | WD (1 ml/100 g) | ET 20 % + WD (1 ml/100 g) | ET 20 % + S. c. (300 mg/kg) | ET 20 % + S. c. (600 mg/kg) |
| Heart | 330.77 ± 6.51 | 342.86 ± 4.35$^{c}$ | 343.29 ± 8.80$^{ns}$ | 333.46 ± 21.56$^{***}$ |
| LV | 79.47 ± 5.22 | 114.42 ± 20.38$^{c}$ | 80.15 ± 3.54$^{***}$ | 83.84 ± 4.39$^{***}$ |
| LV (g)/MH(g) | 0.23 ± 0.01 | 0.33 ± 0.05$^{a}$ | 0.22 ± 0.01$^{**}$ | 0.24 ± 0.03$^{**}$ |

WD = Water distilled; ET = Ethanol à 20 %; S.c. = *Strychnos camptoneura*; LV = Left ventricle; MH = Masse of the heart. The values are mean ± ESM, with n = 8; [a] p <0.05 and [c] p < 0.001 meaningful difference in relation to the witness (water distilled); **p < 0.01 and *** p < 0.001 meaningful difference in relation to the witness (ethanol + water distilled); ns: no meaningful difference in relation to the witness.

**Table 3: Variation of the biochemical parameters in rat.**

| Biochemical parameters (g/l) | Treatment | | | |
|---|---|---|---|---|
| | WD (1 ml/100 g) | ET + WD (1 ml/100 g) | ET + S. c. (300 mg/kg) | ET + S. c. (600 mg/kg) |
| Triglycerides | 1.11 ± 0.21 | 2.22 ± 0.48$^{a}$ | 0.78 ± 0.06$^{*}$ | 1.07 ± 012$^{ns}$ |
| Cholesterol total | 0.69 ± 0.07 | 0.70 ± 0.04$^{ns}$ | 0.60 ± 0.02$^{ns}$ | 0.59 ± 0.04$^{ns}$ |
| Glycemia | 1.02 ± 0.19 | 2.13 ± 0.18$^{a}$ | 1.18 ± 0.16$^{*}$ | 1.15 ± 0.03$^{*}$ |
| Creatinine (#) | 8.98 ± 0.70 | 8.93 ± 0.59$^{ns}$ | 8.92 ± 0.27$^{ns}$ | 9.83 ± 0.69$^{ns}$ |
| Urea | 0.67 ± 0.13 | 0.77 ± 0.19$^{ns}$ | 0.40 ± 0.04$^{ns}$ | 0.58 ± 0.11$^{ns}$ |

WD = Water distilled; ET = Ethanol à 20 %; S.c. = *Strychnos camptoneura*. (#): mg/l. The values are mean ± ESM, with n = 8; [a] $p < 0.05$ meaningful difference in relation to the witness (water distilled); *$p < 0.05$ meaningful difference in relation to the witness (ethanol + water distilled); ns: no meaningful difference in relation to the witness.

## DISCUSSION

The factors of cardiovascular risk induced by the overcharge éthanolique subchronique at the wistar rat studied are: the overweight, the hypertriglyceridemia, the hypercholesterolemia, the hyperglycemia and the left ventricular hypertrophy. Numerous studies showed that the free radical production is one of the main factors responsible for messes metabolic and organic of the toxicity of the ethanol (*S. camptoneura* Lieber, 1997 and 1999). The results gotten show that the aqueous extract of the stems bark of (300 and 600 mg/kg) reduced the increase weight induced by the ethanol. So, it protects against this cardiovascular risk factor (Ahmed Habbout, 2010). The aqueous extract of the stems bark of *S. camptoneura* to the studied doses opposes the increase of the masses of the heart, of the left ventricle and of the report left ventricle - bodily mass provoked by the administration subchronique of the ethanol 20 %. It is returned that the correction of the left ventricular hypertrophy (HVG) decreases the morbidity and mortality cardiac in the arterial hypertension (Verdecchia and al., 1998; Mosterd and al., 1999). To Congo, the sharp poisoning following the consumption of the alcohol is kept like factor having triggered a crisis hypertensive at the half of the patients (Franco and Oparil, 2006). Otherwise, the aqueous excerpt of the stem bark of *S. camptoneura* (300 and 600 mg/kg) opposes to the hypertriglyceridemia and the hyperglycemia provoked by the ethanol 20%.

It would also protect against these two factors of cardiovascular risk. This result is in agreement with the hypoglycemia effect of this extract to 600 mg/kg shown by Gombé, (2014). It is necessary to note that it is possible that this excerpt also acted against the metabolic syndrome. Indeed, the overweight, the hypertriglyceridemia and the hyperglycemia are three important factors of the metabolic syndrome (Habbout, 2012). On the other hand, this extract is without effects on the concentrations of total cholesterol, the creatinine and the urea. These results let think that in our applied conditions the ethanol 20% only or the aqueous extract of the stems bark of *S. camptoneura* (300 and 600 mg/kg) at the rats treated to the ethanol 20% would not affect the working of the kidneys. The weak volume (4 ml) the ethanol managed to the rats in the present survey could explain the absence of effects of this one on the rates of the creatinine and the urea. Indeed, Saihia, (2014) showed that the administration of 10 ml of ethanol 20% provokes at the rabbit male *Oryctolagus cuniculus* an increase of the rate of urea and creatinine in relation to the witness.

## CONCLUSION

The results of the present survey suggest that the aqueous extract of the stems bark of *S. camptoneura* reduces the factors of cardiovascular risk (overweight, left ventricular hypertrophy, hypertriglyceridemia and hyperglycemia) induced by the overcharge subchronique éthanolique 20 % at the Wistar rat. It is necessary to achieve a survey of the effects of this excerpt on the metabolic syndrome at the rat.

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