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Aloe Schweinfurt Hii Gel for The Safe Care of The Oral Cavity Aloe Schweinfurt Hii Gel for The Oral Cavity in Complete Safety

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Abstract

Introduction

With a view to resolving public health problems relating to the conservation of expelled immature permanent teeth, the conservation environments evaluated in tropical zones are poorly accessible and unavailable, which pushed our research towards alternative environments through Aloe schweinfurthii. This involved researching the cost/dose ratio, accessibility, effectiveness and safety. Our general objective was to evaluate the capacity of Aloe schweinfurthii gel to safely ensure the survival of the periodontal ligament cells of a immature permanent tooth expelled.

Methodology

This experimental study of the toxicity of A.schweinfurthii gel involved acute and subacute toxicity. We evaluated the effects on the animals' weight, liver, kidney and hematological parameters as well as the histopathology of the organs. Statistical analyzes were carried out by SPSS version 23.0, Graph pad prism version 8.0.1. and tests: ANOVA, Student and Newman-Keuls; $P < 5\%$.

Results

The d'A. schweinfurthii administered did not cause any animal death, nor show any obvious sign of toxicity. The weight gain of rats in acute and subacute toxicity was observed. A decrease in liver, lung and brain weight was noted in the normal groups at both doses. An increase in the level of Alat, ASAT, serum creatinine, serum uric acid, white blood cells at satellite doses. The histopathology of the organs showed no cellular disorganization or damage to the liver and kidney tissues.

Conclusion: *Acute and subacute toxicity tests were unremarkable.*

A.schweinfurthii gel appears to be a good medium for preserving CLP in complete safety.

Keywords: Aloe Schweinfurthii, Toxicity, Conservation Medium, Expelled Immature Permanent Tooth, Cellular Vitality.

Introduction

For cell survival, several conservation media have been evaluated in tropical areas [1, 2]. This is the case for whole milk physiological serum saliva [1]. These media are non-regenerative, anti-inflammatory, antibacterial and/or disinfectant. Some of these media are difficult to access, expensive and/or non-regenerative and have pushed research towards alternative plant-based media [3]. Plants have always played a vital role in medical care. Nearly 80% of people in developing countries use them to treat themselves [4,5]. In Cameroon, several studies have highlighted the effectiveness of medicinal plants in the treatment of certain conditions [4,5]. These medicinal plants can therefore constitute important resources for new substances with therapeutic potential and at low costs. Plants contain secondary metabolites with a wide range of biological activities and a great diversity of chemical structures [5,6]. However, the quality, safety and efficacy of commonly used herbal formulations can be debated. Indeed, several studies conducted on traditional herbal treatments have reported toxicity problems [6]. Some plant organs, such as leaves, barks, roots, gels are used in the treatment of common ailments. This is the case of Aloe mucilaginous gel which is used almost everywhere in the world and, therefore, the efficacy has been proven for the preservation of living cells but not the safety. There are nearly 400 species of Aloe of which half a dozen are known for their medicinal properties [7,8,9].

Methods

This was an experimental, cross-sectional, descriptive and analytical study that took place over two years in Yaoundé (Cameroon). It was approved by the Ethics Committee of the Yaoundé University Hospital in 2015. To which is added the multidisciplinary laboratory of pharmaceutical sciences FMSB of the University of Yaoundé I.

Material

The material used for this study included:

- **Plant Material:** Aloe Schweinfurt Hii gel identified by the national herbarium of Cameroon
- **Solvents:** Aqueous eosin and physiological serum;
- **Human Material:** Periodontal ligament of teeth extracted atraumatically;
- **Animal Material:** consisting of male and female albino rats, Rattus norvegicus of the Wistar Strain. - Laboratory equipment, clinical examination and measuring devices, spectrophotometer and magnetic stirrer. The measuring devices, the spectrophotometer and the magnetic stirrer.

Figure 6: Matériel utilisé

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3.2.8- Collecte et extraction du gel d'*A.schweinfurthii*

Idem que partie I

3.2.9- Préparation des volumes de solution d'essai

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

D = dose d'essai (mg/kg)

C = concentration du gel d'A.S (mg/mL)

P = poids de l'animal (kg)

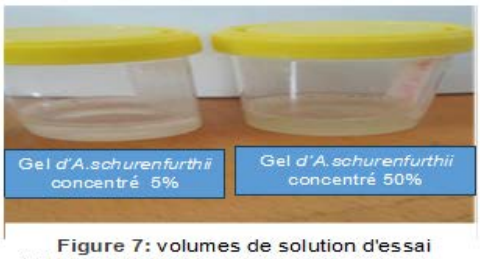

Figure 7: volumes de solution d'essai (2000 et 5000) mg / kg de poids corporel

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Evaluation of The Acute Oral Toxicity In Vitro of A. Schureenfurthii Gel

the acute oral toxicity in vitro of aloe vera Schweinfurthii gel was conducted according to OECD guideline 425. It consisted in highlighting the maximum tolerated concentration of A.schweinfurthii gel / oral administration in single dose / 24 h. It was conducted on 9 female rats randomly divided into 3 groups aged 6-8 weeks with an average weight of (94 ± 10 g). This study was conducted in albino rats of Wistar strains with therapeutic doses of 5% and 50% having shown a good conservation activity of the immature permanent tooth.

Protocol

The acute oral toxicity study consisted in determining the lethal dose 50 (LD50) and the toxic effects of the aqueous extract of Aloe schweinfurthii Baker administered as a single dose to female rats. The methodology used was that described by OECD 425 (Organisation for Economic Co-operation and Development) with some modifications [9]. The experiment was conducted on 9 female rats weighing between 94 and 112 g. The animals were randomly selected, marked for identification purposes and randomly distributed into three groups of 3 animals each. The dose to be administered was calculated according to the fasting body weight of each animal according to the formula for calculating the initial volume according to weight. The animals were fasted for 12 hours but were hydrated the night before the experiment. Doses of Aloe schweinfurthii Baker mucilaginous gel of 2000 and 5000 mg/kg were administered orally as a single dose to rats in groups 2 and 3. Administration was by gavage (intra-esophageal route) at a rate of 1 ml per 100 g of body weight. The first group, which was the control, received distilled water. Treated animals were observed for 14 days for signs of acute intoxication. Food was distributed to the animals 4 hours after treatment. Animals were observed individually at least once every 30 minutes for the first 4 hours, regularly for the first 12 hours after gel administration. They were then observed daily for 14 days. After 14 days of observation, the animals were sacrificed following a subcutaneous injection of ketamine at a dose of 1 mL/kg, the animals underwent a complete and detailed macroscopic autopsy, to confirm the toxic effect of the gel, including: weight gain, relative organ weight and the dosage of biochemical and hematological parameters.

Subacute Toxicity

Subacute oral toxicity was conducted according to OECD Guideline 407, as amended. It consisted of highlighting any effects related to repeated doses as well as a concentration without adverse effects observed at the lowest dose (OECD, 2008).

Weight changes (Vp) were calculated from the formulas opposite as well as the relative weight of the organs. The dosage of biochemical parameters was carried out according to the protocols provided with the Biolabo commercial kits revised on July 27, 2011. Serum proteins were measured by the Biuret method described by Gornall et al. 1949). (mix the reagent of 3ml of gornall at different concentrations to 2ml of protein solutions known concentrations, incubate at 37 degrees for 30min. Let cool and measure the absorbance at 540nam. The counting of hematological data was carried out using a hematological analyzer of hospitals. The histological examination consisted of the preparation of tissues and or organs for their observation under the microscope. We used appropriate software and tests. Spss! calculation of means and standard deviation on the mean, graph pad = Anova graphs = (Variances), Newman-Keuls: to determine the differences between the means in the groups (variance). $P < 5\%$. To conduct this study on rats we obtained the Authorization of the Institutional Committee of Ethics and Research of the FMSB of the University of Yaoundé I.

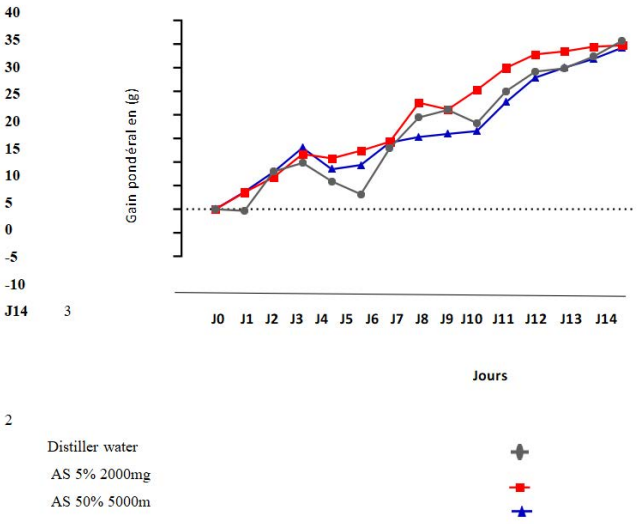
All animal experiments were conducted in accordance with the rules and regulations of European Union on the treatment of animals described by Smith and his team and adopted by the institutional council of the Ministry of Scientific Research and Innovation of Cameroon.

Results

For the assessment of the general toxicity of A. schuweinfurthii gel on albino rats Rattus norvegicus, we used 59 rats of both sexes aged 6 to 10 weeks: 9 female rats (acute toxicity). 25 female rats and 25 male rats (subacute toxicity).

Evaluation of the Acute Oral Toxicity of A.Schweinfurthii Gel
During the first 30 minutes, a slight drowsiness was observed. The observation on the color of the animals' coat, their feces, perception of pain, salivation state, motor skills, appetite showed no particularity. These doses did not cause the death of any animal. No visible sign evoking the toxic nature of A.schweinfurthii gel was observed. All observations were recorded systematically and recorded in a weekly table.

Evolution of the Weight Mass of Rodents During Acute Toxicity highlights the weight gain of the animals according to the different doses of A.schweinfurthii force-fed compared to the control group having consumed distilled water. The respective initial body weights of the treated rats and the controls showed an increase since the first day. This increase becomes more significant for the animals having consumed the mucilaginous gel of A.schureenfurthii compared to the control from the 4th day particularly with the dose of 2000mg with a significant difference ($P < 0.001$). From the 7th day the rats of the group having consumed 5000mg undergo a weight loss paraport to the control group with a significance ($P < 0.05$) and to the group having consumed 2000mg with a significant difference ($P < 0.01$). In general, the weight of all batches increased with a marked increase in the batch of rats having consumed 2000 mg of A.schureenfurthii gel compared to the control batch and that of 5000 mg from the 10th day with significance ($P < 0.05$). An identical mass was observed at the last weighing.



Each point represents the mean weight ± SEM, n=3 1: $P < 0.001$ significant difference compared to rats that consumed A. schurenfurthii gel 2000mg and the control group; 2: $P < 0.01$ significant difference compared to rats that consumed A. schurenfurthii gel 5000mg and the control group; 3: $P < 0.05$ significant difference compared to rats that consumed A. schurenfurthii gel 2000mg and the group that consumed A. schurenfurthii gel 5000mg.

n = number of animals per group, SEM: standard deviation of the mean.

Figure

Effect of A. schweinfurthii gel on the evolution of the weight mass of rats in acute according to the different doses of A.schweinfurthii force-fed compared to the control group having consumed distilled water. The relative weight of the organs of rats in acute toxicity is marked by a significant decrease in the weight of the lungs of rats having consumed the A.schureenfurthii gel at two doses of 2000 and 5000mg compared to the control group with a significance threshold set at $p<0.001$. The relative weight of the brain and lungs increased in rats having consumed the A. schureenfurthii gel at two doses of 2000 and 5000mg compared to the control group with a significance threshold set at $p<0.01$. The relative weight of the spleen increased in rats having consumed the A.schureenfurthii gel 5000mg compared to the control group with a significance threshold set at $p<0.05$.

Table: Relative Weight of Organs Removed During Acute Toxicity

Organe	Dose (mg/kg)		Groupe contrôle
	2000	5000	
Foie	5,4±0,52[3]	5,2±0,41[3]	5,4±0,51
Rein	0,44±0,08[3]	0,45±0,11[3]	0,415±0,16
Cœur	0,50±0,12[3]	0,43±0,13[3]	0,50±0,23
Rate	0,53±0,10[3]	**0,8±0,35[2]**	0,53±0,10
	0.86±0.23[1]	1,3±1,01[1]	2,2±0,88
Cerveau	**1,5±0,27[2]**	**1,5±0,31[2]**	1,13±0,23

Each value represents the mean ± SEM (n=3). 1: $P < 0.001$ significant difference in rats that consumed A. schurenfurthii gel compared to rats in the control group; 2: $P < 0.01$ significant difference compared to rats that consumed A. schureenfurthii gel 5000mg and the control group; 3: $P < 0.05$ significant difference compared to rats that consumed A. schurenfurthii gel 2000mg and the group that consumed A. schurenfurthii gel 5000mg. n= number of animals per group, SEM: standard deviation of the mean.

Evaluation of the Subacute Oral Toxicity of Aloe Schweinfurthi Gel

General Signs

In the present repeated dose toxicity study for 28 days with the dose 5000 mg/kg, 2 deaths were observed on day 19 following poor gastric gavage. Indeed, the animals would have received the gel on a false route during which the gavage product would have entered the lungs. No visible signs evoking the toxic nature of the gel were observed during the experiment on rats that had consumed the A. schurenfurthii gel. In terms of general behavior, the rats did not show any particular signs evoking the toxic nature of the gel.

Effects of A.Schweinfurthii Gel on Weight Parameters in Subacute Toxicity

The monitoring of the variation in the growth of animals during the experiment of subacute toxicity at repeated doses for 28 days by A.schurenfurthii gel in males was noted in Figure 43. It highlights the weight gain of the animals according to the different doses of A.schurenfurthii force-fed compared to the control group having consumed distilled water. The respective initial body weights of the treated rats and the controls showed an adaptation period of approximately three days, especially for the animals having consumed the A.schurenfurthii gel 5000mg. In general, the weight of all groups of normal rats that consumed A. schurenfurthii gel increased compared to the control group with a significance threshold set at $P < 0.05$. The rats in the satellite group that consumed 5000 mg increased in weight compared to the satellite control group with a significance $P < 0.01$. The group that consumed 5000 mg lost weight in the last days compared to the control with a significant difference set at $P < 0.01$. This increase is more significant for the satellite animals that consumed the mucilaginous gel of A. schureenfurthii compared to the normal group with a significant difference set at $P < 0.001$. Some non-toxic plants can have a harmful effect on various human or animal organs, due to their use at high doses or their absorption over a long period. The toxicity study was carried out according to the OECD Guidelines. Our work showed that the mucilaginous gel of Aloe schweinfurthii does not have significant effects on behavioral and physical characteristics of rats and does not cause death of animals up to the dose of 5000 mg/kg. These results suggest that the gel of Aloes schureenfurthii is not toxic and is well tolerated in rats. The lethal dose LD50 of A. schurenfurthii gel could not be obtained at the doses studied. Its lethal dose would therefore be at doses greater than 5000 mg/kg. This is the same method that was used who showed that the LD50 of the aqueous extract of Cymbopogon citratus (Poaceae) is also greater than 5000 mg/kg [10]. As Mikolo et al say, this important LD50 limit would indicate a wide margin of safety for consumption of the plant[11]. A. schurenfurthii gel has a toxicity index equivalent to 5, according to the scale of toxicity of a chemical substance according to the LD50 and the route of administration [157]. During acute toxicity, the weight gain of rats is marked by a significant increase in weight in all groups at 1: $P < 0.01$; 2: $P < 0.05$; 3: $P < 0.001$.

This increase is more significant in female rats having consumed 2000 mg/kg and an equality of mass at the last weighing. Classic tests for determining the LD50 show that, although the difference in sensitivity between the two sexes is generally small, in cases where a difference is observed, females are generally slightly more sensitive [12]. The increase in weight is in close line with the absence of morbidity observed at the level of clinical signs and demonstrates the absence of toxicity of the gel during acute toxicity. For, a single exposure without signs of morbidity can

conclude an absence of toxicity for the study period [13]. This is all the more important since the expelled tooth will only remain in the solution for 24 hours, therefore its use can be done safely.

Changes in body weight were used as indicators of the toxic effects of the gel; since no significant changes in body weight were observed in rats in the treated groups compared to the control after daily treatment for 28 days, it is suggested that oral administration (acute and subacute) of A. schurenfurthii mucilaginous gel has no effect on the normal growth of rats. It can be concluded that A. schurenfurthii gel stimulates weight growth, particularly at a dose of 2000 mg/kg in rats.

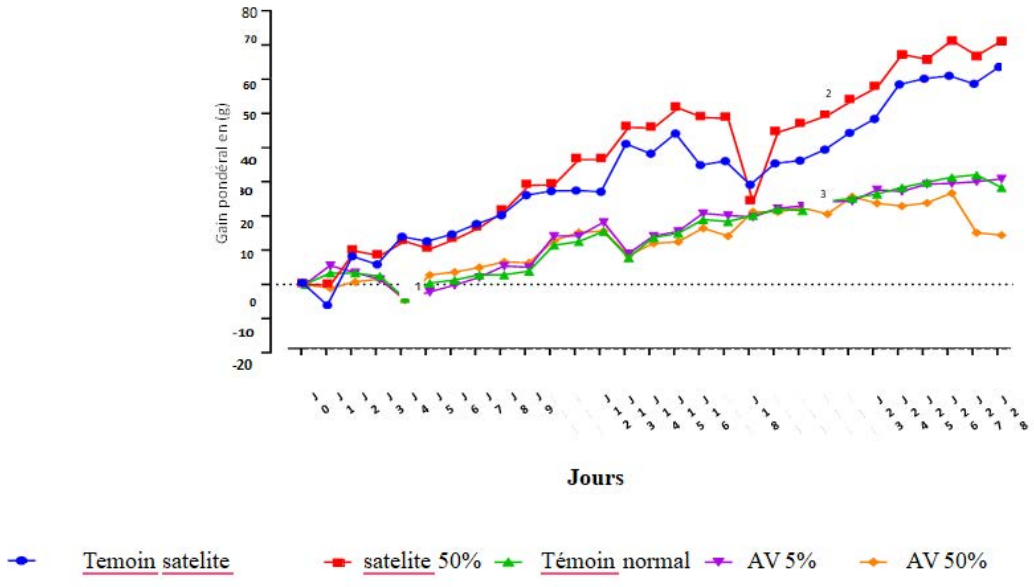
However, in the 5000 mg/kg satellite group (50%), at $p < 0.01$ there was an increase in the weight of the liver, heart, lungs, kidneys and brain in males or females. Suggest that the liver and kidney are two important organs of detoxification, the increase would be due to a potential hepatotoxicity of the gel on the liver [14]. The analyses carried out allowed us to observe an increase in the ASAT rate in animals of both sexes, accentuated at doses of 5000 mg/kg satellite, which is a sign of hepatoxicity of the gel at this dose. The dose of 5000 satellite corresponds to prolonged exposure of the animals to the gel and to a high concentration thus increasing the toxic risk. The toxic effects of most substances depend not only on the physiological state of the exposed animal, time of exposure but also on the duration of exposure. Hepatomegaly induced by Aloe schureenfurthii gel at a concentration of 5000 mg/kg is a phenomenon reported by many authors following aggression by chemical substances [15,16].

The different doses of A. schurenfurthii gel did not cause any significant variation at $p < 0.05$ in ALAT in male animals or a decrease in ALAT levels was observed at both doses in the normal groups, which demonstrates the protective action of the gel on male animals in the normal groups. ALAT increased little than ASAT, so the degrees of increase are different, therefore we cannot conclude that the gel is harmful to the liver at the concentrations used. Indeed, in an imprecise clinical picture, it is possible to admit with near certainty a hepatic component when the serum activity of ALAT is higher than that of ASAT [17].

Analysis of urea and creatinine revealed that administration of the gel did not cause any significant change. The mucilaginous gel of Aloes schureenfurthii significantly increased the white blood cell count at almost all concentrations administered compared to the control. Suggested that the elevation of white blood cell count in treated rats directly indicates a strengthening of the immune system [18]. A. schurenfurthii gel significantly caused the decrease in platelet count at all concentrations consumed and therefore it could increase the risk of hemorrhage. This implies the potential for activation of bleeding during the reimplantation of the ejected tooth. This gel should therefore be used sparingly and at the lowest possible concentrations.

The administration of A. schweinfurthii gel did not cause any cellular disorganization or damage to liver and kidney tissues. Microphotographs of liver, kidney and heart sections obtained from control and treated rats (male and female) in the different groups did not show any histopathological signs. Which testifies to its absence of toxicity in the concentrations used. This observed safety may be due to the fact that we used the mucilaginous part of A. schweinfurthii and not the whole leaf which contains the latex and is rich in anthraquinones so the intracellular reactions contribute to photo-carcinogenicity.

This study did not find any toxicity of the gel; however, it is different from that which demonstrated the cytotoxic power of the extract of whole leaves of Aloe vera [19]. Indeed, we used only mucilaginous gel of A. schurenfurthii while the study mentioned used the whole leaf which contains latex, a toxic element of the plant.



Each point represents the mean weight ± SEM (n=5) 1: P < 0.01; 2: P < 0.05; 3: P < 0.001, n= number of animals per batch, SEM= Standard deviation of the mean = standard error of the mean.

1: P < 0.05 significant difference of normal rats having consumed A. schurenfurthii gel compared to the control batch.
2: P < 0.01 significant difference of rats from the satellite batch having consumed 5000 mg paraport to the satellite control batch;

3: P < 0.001 significant difference of rats from the satellite batch compared to rats from normal batches.
n= number of animals per batch, SEM: standard deviation of the mean.

Figure: Effects of A.schureenfurthii gel on the evolution of body mass of animals in subacute toxicity.
Effect of A.schweinfurthii gel on the relative weight of organs in subacute toxicity.

Effect Of A.Schureenfurthii Gel on The Relative Weight of Organs in Subacute Toxicity in Males

The most significant organs of each animal namely: liver, kidney, spleen, heart, lungs and brain were weighed in order to evaluate the impact of A.schureenfurthii gel on the mass of organs according to the doses and in comparison, with those of the control group. Table XXV shows the effect of A.schureenfurthii gel on the relative organ weight of rats in subacute toxicity and highlights the weight gain of the animals according to the different doses of A.schureenfurthii force-fed compared to the control group having consumed distilled water. The relative organ weight of rats in subacute toxicity is marked by a significant decrease in the weight of the lungs and brain of rats having consumed A.schweinfurthii gel at two doses of 2000 and 5000mg compared to the control group with a significance threshold set at p < 0.001. The relative weight of the spleen, liver and lungs increased in satellite rats having consumed A.schureenfurthii gel 5000mg compared to the satellite control group with a significance threshold set at p < 0.05.

The relative liver weight in rats that consumed A.schureenfurthii gel at two doses of 2000 decreased compared to those of animals that consumed 5000mg with a significance threshold set at p<0.01.

Table X: Relative Organ Weight in Male Animals in Subacute Toxicity
Enregistréeschez Le Mâle

Organes	Satellite 50%	Témoins normaux	A. S 50%	A. S 5%
Foie	**3,115 ± 0,175[1]**	3,147 ±0,249	3,060 ± 0,189[1]	2,844 ± 0,140[1]
Cœur	0,270 ± 0,018	0,271 ±0,030	0,282 ± 0,035[2]	0,272 ± 0,009[2]
Poumons	**0,610 ±0,082 [2]**	0,781 ±0,56[7]	0,678 ± 0,276[3]	0,552 ± 0,068[2]
Reins	0,550 ± 0,020[2]	0,533 ±0,032	**0,564 ± 0,054[2]**	0,517 ± 0,020[2]
Rate	**0,277 ± 0,051[2]**	0,287 ±0,096	0,315 ± 0,106[1]	0,224 ± 0,032[2]
Cerveau	0,740 ± 0,0551	15,920 ± 33,889	0,754 ± 0,0463	0,722 ± 0,0753

Each value represents the mean ± SEM (n=5) 1: P < 0.01; 2: P < 0.05; 3: P < 0.001, n= number of animals per batch, SEM= Standard deviation of the mean = standard error of the mean.

1: P < 0.01 significant difference in rats that consumed A. schurenfurthii gel 2000mg compared to rats in the batch that consumed 5000mg.

2: significant difference in the weight of the spleen, liver and lungs in satellite rats that consumed A. schureenfurthii gel 5000mg compared to the satellite control batch with a significance threshold set at p < 0.05. 3: P < 0.001 significant difference in the lungs and brain of rats having consumed the A.schureenfurthii gel at two doses of 2000 and 5000mg compared to the control group.

Effect of A. Schweinfurthii Gel on The Relative Weight of Organs in Subacute Toxicity in Females

The table represents the effect of A. Schweinfurt Hii gel on the relative weight of organs of female rats in subacute toxicity and highlights the weight gain of the animals according to the different doses of A. schureenfurthii force-fed compared to the control group having consumed distilled water. The relative weight of organs of rats in subacute toxicity in females is marked by a decrease in the weight of the heart and liver of rats having consumed A. schureenfurthii gel at two doses of 2000 compared to the control group with a significance threshold set at p < 0.05. The relative weight of the lungs increased in satellite rats that consumed A. schureenfurthii gel 5000mg compared to the satellite control group with a significance threshold of p < 0.001. The relative weight of the lungs in rats that consumed A.schureenfurthii gel 2000mg increased compared to those animals that consumed 5000mg with a significance threshold of p < 0.01. The relative weight of the liver in rats that consumed A. schureenfurthii gel 5000mg in normal and satellite animals increased compared to the control with a significance threshold of p < 0.05. The data are reported in the table below.

Table: Relative Weight of Organs in Female Animals in Subacute Toxicity

Organe	Témoin Satellite	Satellite 50%	Témoins normaux	A.S 5%	A.S 50%
Foie	2,918 ±0,309	2,931 ±0,163[1]	2,869 ±0,050	2,851 ±0,080[1]	2,882 ±0,116[1]
Cœur	0,293 ±0,017	0,308 ±0,041[2]	0,314 ±0,031	0,306 ± 0,035[1]	0,307 ±0,045[1]
Poumons	0,608 ±0,089	0,714 ±0,139[3]	0,600 ±0,088	0,761±0,197[2]	0,604 ±0,117[1]
Reins	0,573 ±0,025	0,596 ±0,030[1]	0,580 ±0,042	0,597 ± 0,051[2]	0,598 ±0,024[2]
Rate	0,389 ±0,131	0,294 ±0,059[2]	0,235 ±0,023	0,295 ±0,071[1]	0,276 ±0,088[2]
Cerveau	0,909 ±0,060	0,886 ±0,060[2]	0,832 ±0,069	0,901 ±0,032[1]	0,917 ±0,067[3]

Each value represents the mean ± SEM (n=5) 1: P < 0.05; 2: P < 0.01; 3: P < 0.001, n= number of animals per batch, SEM= Standard deviation of the mean = standard error of the mean.

1: P< 0.05: significant difference in liver and heart weight of rats that consumed A.schureenfurthii gel at a dose of 2000 compared to the control batch.

2: : P< 0.01: significant difference in lung weight of rats that consumed A.schureenfurthii gel at a dose of 2000 compared to the control batch.

3: P < 0.001 significant difference in lung weight of satellite rats that consumed A.schureenfurthii gel 5000mg compared to the satellite control batch.

Effect of A.Schureenfurthii Gel on Liver and Kidney Markers in Subacute Toxicity

The effects of A.schureenfurthii gel on serum markers of liver and kidney function in male and female rats in subacute toxicity

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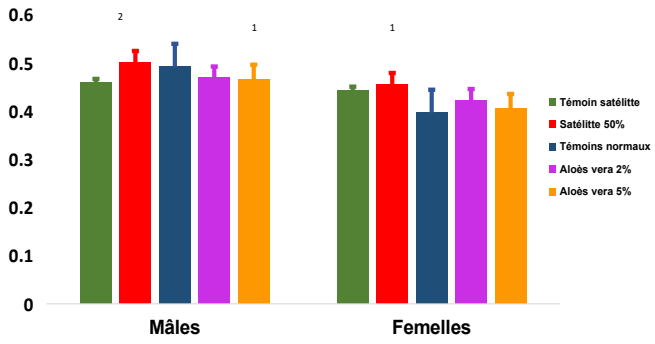
Effect of A.Schweinfurthii Gel on The Alat Level of Rats

Figure shows the effects of A.schureenfurthii gel on the serum ALAT level of animals according to the different consumptions. It appears that Aloes schureenfurthii gel slightly reduces the ALAT level for animals having consumed the normal dosage of 2000mg and 5000mg in males compared to the control with a significance rate stopped at P < 0.05. The ALAT rate is increased for animals in the satellite group having consumed 5000 mg in males compared to the satellite control with a significance rate stopped at p 0.01%.



Each value represents the mean ± SEM (n=5) 1: P < 0.05; 2: P < 0.01; n= number of animals per batch, SEM= Standard deviation on the mean.

1: P< 0.05: significant difference in the weight of the liver and heart of rats having consumed the A.schureenfurthii gel at the dose of 2000 compared to the control batch. 2:P< 0.01: significant difference in the weight of the lungs of rats having consumed the A.schureenfurthii gel at the dose of 2000 compared to the control batch.

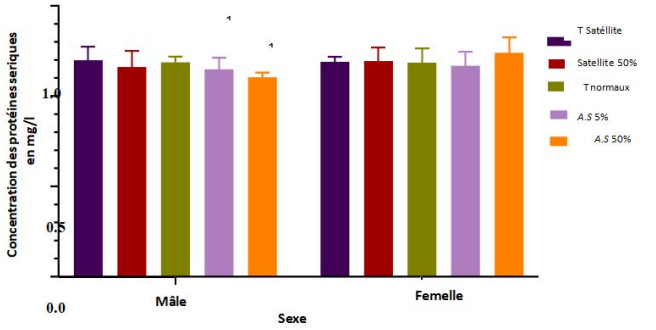
Effects of A. Schweinfurt Hii gel on serum creatinine levels

A.schweinfurthii gel increased serum creatinine levels in rats fed at both doses in female rats.

Effects of A. Schweinfurthii Gel on Serum Total Protein Levels

Serum total protein levels did not undergo any significant change in either sex.

A marginally significant decrease in serum total protein levels was observed in male animals at all concentrations fed A. schweinfurthii gel compared to control with significance level stopped at P < 0.05. The serum total protein level is increased for normal female animals having consumed 5000mg compared to



Each column represents the mean ± SEM (n=5) 1: P < 0.05; 2: P < 0.01, n= number of animals per batch, SEM= Standard deviation of the mean = standard error of the mean.

1: P< 0.05: significant difference in serum total protein levels in satellite rats of both sexes that consumed A. schureenfurthii gel at doses of 5000 mg compared to the control batch.

2: P< 0.01: significant difference in serum creatinine levels of normal animals at doses of 5000 mg of normal animals compared to the control batch.

Figure 48: Effects of A. Schweinfurt Hii Gel on Serum Total Protein Levels

Effects of A. Schweinfurthii on Hematological Tests During Subacute Toxicity

The effects of the gel on blood counts after 28 days of treatm.

Effects of A. Schweinfurthii on Hematological Parameters in Male Animals

Administration of A. schweinfurthii for 28 days caused a moderately significant increase in the white blood cell count in animals of the normal groups at doses of 2000 compared to the control with a significance level of P<0.01. The mucilaginous gel of Aloes schureenfurthii caused a highly significant increase in the lymphocyte count in normal animals that consumed 5000mg and the monocyte count in those that consumed 2000mg compared to the control with a significance level of P<0.001.

Red blood cell counts increased in animals consuming A. schweinfurthii gel 5000mg/kg normal and satellite compared to control with a significance level of P<0.05.

Table: Evaluation of Hematological Parameters in Male Animals

paramètres	Témoin Satellite	Satellite 50%	Témoins normaux	Aloès Schureenfurthi 5%	Aloès Schureenfurthi 50%
GB.103/µL	5,343 ±1,523	5,083 ±2,217[1]	3,643 ±0,791	**8,623 ±5,411[3]**	**4,553 ±1,634[2]**
Neutrophiles (%)	27,63 ±5,162	24,20 ±6,040[1]	30,03 ±2,108	23,20 ±9,002[3]	22,27 ±4,188
Lymphocytes (%)	69,40 ±3,751	**73,57 ±7,454[1]**	66,57 ±2,673	60,53 ±15,667[2]	**75,17 ±3,535**
Monocytes (%)	2,13 ±2,329	1,03 ±0,208[2]	1,40 ±0,656	**15,47 ±23,932[3]**	**1,93 ±0,896[1]**
Eosinophiles (%)	0,83 ±0,306	**1,20 ±1,385[1]**	2,00 ±0,964	0,80 ±0,173[2]	0,63 ±0,305
GR.106/ µL	7,440 ±2,622	**8,543 ±1,243[1]**	8,370 ±0,429	8,247 ±0,674[1]	**8,397 ±0,336[1]**
HGB (g/dL)	13,200 ±2,946	**14,033 ±1,779[1]**	14,067 ±0,702	13,333 ±0,971[1]	**14,200 ±0,200[1]**
HCT (%)	47,30 ±12,644	**52,267 ±7,858[1]**	50,667 ±2,194	49,233 ±3,002[1]	50,467 ±0,764[1]
MCV fl	65,333 ±7,635	61,167 ±3,007[1]	60,567 ±1,966	59,767 ±1,350[1]	60,200 ±3,329[1]
MCH pg	18,500 ±3,214	16,433 ±0,569[2]	16,800 ±0,265	16,200 ±0,265[1]	**16,933 ±0,945[1]**
MCHC (g/dL)	28,200 ±1,572	26,933 ±0,808[2]	27,733 ±0,503	27,067 ±0,681[1]	**28,133 ±0,058[1]**
PLT.103/ µL	642,333 ±336,097	**813,333±132,455[1]**	778,333 ±154,872	**858,000 ±253,821[2]**	723,333 ±137,122[1]

Each value represents the mean ± SEM (n=5) 1: P < 0.05; 2: P < 0.01; 3: P < 0.001, n= number of animals per batch, SEM= Standard deviation of the mean = standard error of the mean.
1: P< 0.05: significant difference in rats that consumed A.schureenfurthii gel compared to the control batch.
2: : P< 0.01: significant difference in rats that consumed A.schureenfurthii gel compared to the control batch.
3: P < 0.001 significant difference in rats that consumed A.schureenfurthii gel compared to the control batch.

Effects of A. Schweinfurt Hii on Hematological Parameters in Female Animals

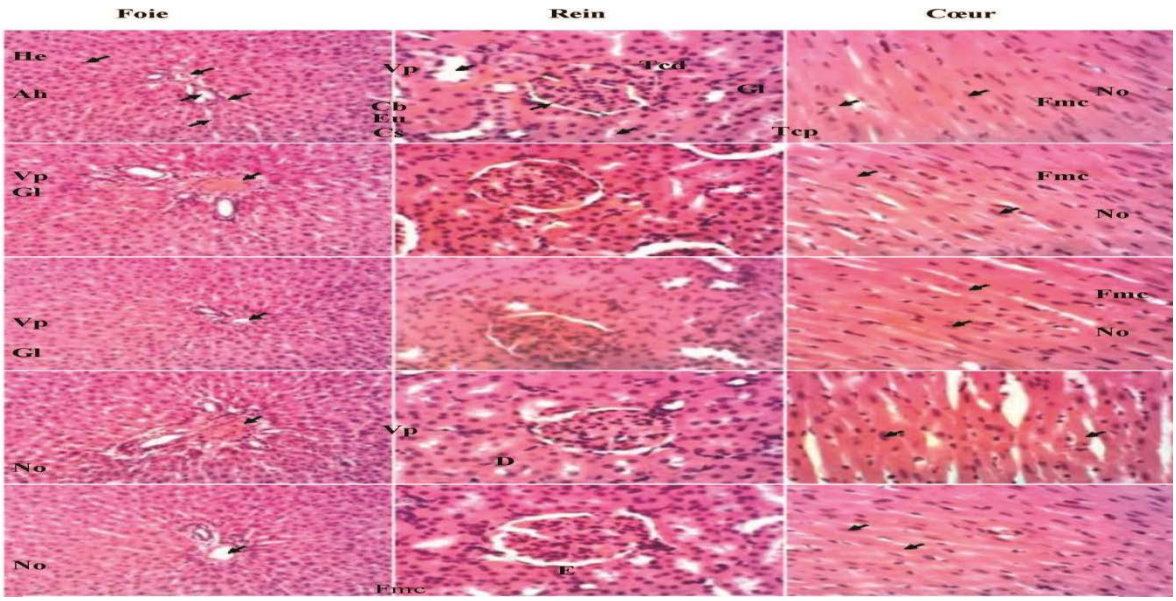
The table shows that the administration of A. schweinfurthii for 28 days caused a significant increase in the white blood cell count in animals at doses of 5000mg compared to the control with a significance level of P<0.01.The mucilaginous gel caused a highly significant increase in the lymphocyte count in satellite animals that consumed 5000mg compared to the control with a significance level of P<0.001.

The red blood cell counts slightly increased in all animals that consumed the A. schureenfurthii gel normal and satellite compared to the control with a significance level of P<0.05. Aloe schweinfurthii mucilaginous gel significantly increased eosinophil counts at almost all administered concentrations. A. schureenfurthii gel significantly decreased platelet counts at all administered concentrations in female animals.

Effect of A. Schureenfurthii Gel on Histological Sections of Harvested Organs

The administration of A. Schweinfurt Hii gel did not cause any cellular disorganization or damage to the portal vein and bile canaliculi. No abnormalities were observed in liver and kidney tissues.

Chez les animaux mâles.



A.Schweinfurthii 2000mg/Kg ; (C) Et (D)= As 5000mg/Kg.Figure: Microphotographs Of The Liver (X100), Kidney (X200) And Heart (X200) Of Male Rats; Hematoxylin-Eosin Staining.A = L1; B = L2; C = L3; D = L4; E = L5; Liver; Vp = Hepatic Portal Vein; He = Hepatocyte; Cs = Sinusoid Capillary; Ah = Hepatic Artery; Cb = Bile Canaliculus; Kidney; Gl = Glomerulus; Eu = Urinary Space; Tcd = Distal Convoluted Tubule; Tcp = Proximal Convoluted Tubule; Heart; No = Cardiac Muscle Fiber Nucleus; Fmc=Cardiac Muscle Fiber.

Liver Histopathology

Hepatocytes are normal and without parenchyma and the liver cells are well organized.

Conclusion

In view of the results obtained, we can deduce that the mucilaginous gel of Aloe schweinfurthii was found to be non-toxic for the majority of the parameters tested, therefore has no influence on the quality of blood function or on vital organs. In addition, it is rich in antioxidants and has antibacterial activities. Its concentration at 5 or 50% can be used safely for 24 to 72 hours for the conservation and regeneration of CLP. This product used in traditional treatments could therefore be prepared and used for the conservation and regeneration of periodontal cells of expelled immature permanent teeth in complete safety [20].

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