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HEALING ACTIVITY OF A TOTAL AQUEOUS EXTRACT OF *SACOGLOTTIS GABONENSIS* (BAILLE) URBAN ON INDUCED WOUNDS IN *WISTAR* RAT

Ousmane Nagalo[1], Mama Kone[2]*, N'Guessan Jean-Baptiste Oussou[3] and Angoué Paul Yapo[4]

[1]PhD Student of Physiology and Pharmacology, Nangui Abrogoua University, Laboratory of Physiology Pharmacology and Pharmacopoeia, Training and Research Unity of Natural Sciences, Abidjan (Côte d'Ivoire).
[2]Senior Lecturer of Physiology and Pharmacology, Nangui Abrogoua University, Laboratory of Physiology Pharmacology and Pharmacopoeia, Training and Research Unity of Natural Sciences, Abidjan (Côte d'Ivoire).
[3]Lecturer of Physiology and Pharmacology, Nangui Abrogoua University, Laboratory of Physiology Pharmacology and Pharmacopoeia, Training and Research Unity of Natural Sciences, Abidjan (Côte d'Ivoire).
[4]Professor of Animal Physiology and Physiopathology, Nangui Abrogoua University, Laboratory of Physiology Pharmacology and Pharmacopoeia, UFR-SN, Abidjan (Côte d'Ivoire).

***Corresponding Author: Dr. Mama Kone**
Senior Lecturer of Physiology and Pharmacology, Nangui Abrogoua University, Laboratory of Physiology Pharmacology and Pharmacopoeia, Training and Research Unity of Natural Sciences, Abidjan (Côte d'Ivoire).

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ABSTRACT
Buruli ulcer is a chronic, debilitating infection of the skin and soft tissues caused by *Mycobacterium ulcerans*. In Côte d'Ivoire, the traditional treatment of this pathology is done orally or cutaneously with *Sacoglottis gabonensis*. It is on six months of mean depending on the patient condition. The objective of this study is to demonstrate for 35 days the efficacy of the total aqueous extract of *Sacoglottis gabonensis* stem bark (TAESg) on extensive second - degree induced wounds by burns in *Wistar* rats. For this purpose, 60 rats were divided into 10 groups of 6 rats/group. Burns are induced on all rats of all groups except group 1. Group 1 received no treatment. Groups 2, 3 and 4 were treated orally and received respectively distilled water, Flukocin® 500 mg at a dose of 14.28 mg/kg bw and TAESg at a dose of 3.5 mg/kg bw. groups 5, 6 and 7 treated by the dermal route, respectively received distilled water, Baneocin® 10 g at a dose of 81.6 mg/kg bw and TAESg at the dose of 5000 mg/kg bw. Batches 8, 9 and 10 treated by the oral route associated with the cutaneous route, respectively received distilled water, Flukocin® 500 mg at a dose of 14.28 mg/kg bw, Baneocin® 10 g at a dose of 81.6 mg/kg bw and TAESg at a dose of 3.5 and 5000 mg/kg bw. Healing activity was assessed macroscopically using scoring methods and planimetrically using percentage shrinkage and healing speed. The results indicated a loss of body weight in rats after induction. After one week of treatment, a highly significant increase in weight by the oral and cutaneous routes and very highly significant by the combination of the two routes, was observed in all of the treated rats with TAESg and the reference substances compared to the treated groups with distilled water. Similarly, macroscopic observation of rat wounds showed a decrease in wound surface area leading to a very highly significant decrease in burn scores and inflammation at the level of the combined pathway. The percentage of shrinkage and the speed of healing experienced a highly significant increase by the oral and cutaneous routes and very highly significant by the combined route. Ultimately, TAESg has healing activity by accelerating the process of wound shrinkage and promoting wound closure through the appearance of epithelial tissues. TAESg has a similar activity to that of Flukocin® and Baneocin®.

KEYWORDS: *Sacoglottis gabonensis*, Wounds, Healing, Rat.

INTRODUCTION
African populations are faced with the emergence or re-emergence of infectious pathologies, the treatment and monitoring of which constitute an additional socio-economic problem for them.[1] At the forefront of these pathologies is Buruli ulcer (BU), a skin infection caused by *Mycobacterium ulcerans*, present in the environment.[2,3] Africa is the most affected region, particularly West Africa where it is highly endemic with a prevalence of 50%, the majority of cases being children under 15.[4] Côte d'Ivoire is one of the most endemic countries with more than 2,000 new cases per year.[5] In 2007, the National Buruli Ulcer Control Program (PNLUB) counted 25,617 cumulative cases from 1978 to 2006.[6] In addition, the WHO notified nearly 30,000 cases in Côte d'Ivoire in 2008.[7] Antibiotic therapy is used for the treatment of BU regardless of the stage of the disease for 4 to 8 weeks, which results in the healing of early lesions, stabilization of the disease or regression of the lesions allowing less dilapidated surgical

excision.[3] Currently, there is no effective long-term vaccine against BU.[8] Many side effects of this antibiotic therapy have been identified, especially in children, including liver, kidney, auditory and vestibular damage.[9] Also, the surgical treatment of wounds, in combination or not with antibiotic therapy, presents other constraints, including inconvenient side effects, the high cost and the long duration of hospitalization and/or treatment for many patients coming from majority of rural areas.[10] This long duration is due to the fact that the healing of the wound goes through several processes allowing a reconstitution of the necrotic skin.[11] In order to fight and contribute to the management of BU, it is imperative to find alternative treatments based on medicinal plants that are safe, effective, adapted and easily accessible. Indeed, many patients very often and first-line resort to traditional medicine and particularly to medicinal plants to treat this pathology.[12,13] With this in mind, the World Health Organization (WHO) has recommended a strategy based on the accessibility, efficacy, safety and quality of herbal medicines. This strategy should ultimately lead to the development of improved traditional medicines and the integration of traditional medicine into healthcare and public health systems.[1] It is within this framework that the Laboratory of Physiology, Pharmacology and Pharmacopoeia (LPPP) of the Nangui Abrogoua University of Abidjan (Côte d'Ivoire) carried out studies on *Sacoglottis gabonensis*, (Baille) Urban (Humiriaceae), a plant used orally and cutaneously in the treatment of Buruli ulcer in Côte d'Ivoire.[14] Work on the anti-mycobacterial activity on the growth of *M. ulcerans*, acute toxicity tests, subacute toxicity by the oral and cutaneous routes and the oral subchronic toxicity test of the total aqueous extract of the stem bark of *Sacoglottis gabonensis* (TAESg) already carried out in the laboratory, gave satisfactory results.[15, 16, 17, 18] In order to verify the effectiveness of this plant on the healing of a simple uninfected wound and to recommend it as an alternative means in the management of burn-type wounds in Côte d'Ivoire, our work proposes to evaluate the healing activity of the total aqueous extract of the stem bark of *Sacoglottis gabonensis* on burn-induced wounds in rats over a period of 35 days. Specifically, it is an evaluating of the effect of *Sacoglottis gabonensis* stem bark total aqueous extract on weight gain during the healing process, then evaluating the healing process through the macroscopic and planimetric method.

MATERIAL AND METHODS

Plant material

It consists of the stem bark of *Sacoglottis gabonensis* (Baille) Urban (Humiriaceae). These barks were harvested in March 2021 in Ingrakon in the Alépé region, a town located about 45 km from Abidjan district. A sample was identified in accordance with that kept at the Center National de Floristique (CNF) under number 1154 of June 16, 1965.

Animal material

The experiments are conducted on male and female albino rats of the species *Rattus norvegicus* of the *Wistar* strain. They all come from the animal facility of the Laboratory of Physiology, Pharmacology and Pharmacopoeia of Nangui Abrogoua University (UNA). They are 3 to 4 months old and their body weight has varied between 140 to 200 g. They were housed in plastic cages with a stainless steel lid and provided with feeding bottles. A layer of wood shavings was placed at the bottom of the cages to form the bedding. The animals are subjected to a temperature of 22 ± 2°C with a photoperiod of 12 hours. The rats are fed daily with granules from the company IVOGRAIN® and tap water without interruption in bottles. The experimental protocol and the animal handling procedures are carried out according to good laboratory practices.[19]

Preparation of the total aqueous extract

The fresh harvested bark was crushed into small pieces and then dried in the laboratory on the bench at a temperature of 25°C for four weeks. The dried bark was reduced to a fine powder using the Retsch SM 100 grinder. The preparation of the total aqueous extract is done according to the preparation method described by some authors.[18] Four hundred grams (400 g) of powdered stem bark of S. gabonensis are dissolved in two liters (2L) of distilled water and the whole was boiled for 30 minutes. After cooling, the decoction was filtered, first on absorbent cotton, then on Wattman N°1 paper. The filtrates was dried in an oven at 50°C for 48 hours. A dry brown powder which was TAESg was obtained. This powder was used to prepare the different concentrations of TAESg.

Evaluation of healing activity

The healing activity was evaluated in an experimental burn model in rats.[20,21] The adaptation was at the level of the temperature and the induction time of the wound in order to create extensive wounds.[22] Sixty (60) rats were evenly distributed into ten groups of six rats at the rate of three male rats and three female rats which were separated in individual cages.

Burn induction

The rats were anesthetized by inhalation in a bell jar containing cotton soaked in ethyl ether for 2-3 minutes. The dorsal flank of anesthetized rats was shaved and cleaned with alcohol 24 hours before burn induction. The experimental burns were induced using a metal cylinder 3 cm in diameter connected to a rod with a sleeve. The cylinder heated to a temperature of 200°C was applied for 20 seconds by lightly pressing the surface of the shaved skin of the rats in order to cause extensive deep second-degree burns.[22] This burn was characterized by damage to the epidermis and dermis with the presence of blisters (liquid of vascular origin forming a bubble that develops at the epidermis-dermis interface) with a red background, whitish areas.[23]

Animal treatment
All animals were treated over a period of 35 days according to the distribution of groups and administration route. Group 1 normal control (NoC) did not experience wound induction and received no treatment.

Oral route
This route took into account groups 2, 3 and 4. The animals of these different groups treated by the oral route received a volume of the substance concerned according to their body weight, once a day at the same time (09 a.m.). Thus, group 2, positive control (PC Or), received distilled water. Group 3, negative control (NC Or) received Flukocin® 500 mg at a dose of 14.28 mg/kg bw and group 4, test (T Or), received the total aqueous extract of stem bark of *S. gabonensis* at a dose of 3.5 mg/kg bw.

Cutaneous route
It concerned groups 5, 6 and 7. All the rats receive treatment by local application according to weight and those every other day at the same time. Group 5, positive control (PC Cr) was treated with distilled water. Group 6, negative control (NC cr) is treated with Baneocin® 10 g at a dose of 81.6 mg/kg bw. Group 7, test (T Cr) was treated with the total aqueous extract of the bark of stem of *S. gabonensis* at a dose of 5000 mg/kg bw.

Oral route associated with the cutaneous route
Group 8, positive control (PC Cor), received distilled water by gavage and by local application. Group 9, negative control (NC Cor), received Flukocin® 500 mg at a dose of 14.28 mg/kg bw orally and Baneocin® 10 g at a dose of 81.6 mg/kg bw. p.c. by the cutaneous route. Group 10 (T Cor), received the total aqueous extract of the stem bark of *S. gabonensis* at a dose of 3.5 mg/kg bw and by the cutaneous route at a dose of 5000 mg/kg bw.

Body mass assessment
Before the experiment, all animals were weighed. Weight growth was monitored individually by weekly weighing. These weighings made it possible to determine the weight gain mean according to some authors.[24]

Macroscopic evaluation of wound healing by scoring methods
It consisted in evaluating the healing of the wound from burn evolution scores and inflammation evolution scores. The scores evolution of the burns varied according to the severity of the burn (Table I). Inflammation progression scores were evaluated by looking for the presence of swelling, redness and exudate (Table II). A score from 0 to 3 is assigned to determine each parameter (size, swelling, exudate, redness) then the four scores are added together. A score of 0 indicated better wound evolution and a maximum score of 12 reaveled the worst.[25]

Planimetric evaluation
It corresponds to the evaluation of the contraction or shrinkage and the speed of wound closure. It was evaluated in the different groups every two days by measuring the diameter using a caliper or a graduated ruler in order to determine the percentage of contraction as well as the speed of healing of the wounds respectively. from the following formulas.[26, 27]

Wound surface = [(large diameter/2) x (small diameter/2)] x π
Shrinkage percentage = $[(Sj_0 - Sjx)/Sj_0] \times 100$
Sjx: Surface area of the wound on day x (cm^2)
Sj_0: Surface of the wound on the initial day (cm^2)
Wound healing rate = S(n – 1) – Sn/Jn –J(n-1)
Wound healing rate (cm^2/day)
S(n-1): Surface of the wound the day before
Sn: Surface of the wound on day n
Jn - J(n-1): Variation of time between each measurement

Statistical analyzes
Data were analyzed using Graph Pad Prism 8.0.1 software (San Diego, CA, USA). The values of the determined variables are expressed as the mean followed by the standard error on the mean (M ± SEM). Statistical significance was determined by analysis of variance followed by Turkey's or Bonfferoni's test depending on the ANOVA test used. A probability threshold $p < 0.05$ was chosen for the significance of all the statistical tests.

RESULTS

Effect of the total aqueous extract administration on the body mass
Figure 1 presented the evolution of the weight of the rats during the healing process of the induced wounds. Before the induction of the wounds, the body weights of the animals were 182.3±8.21; 183±13.75; 176±20.58; 161±14.1; 176.7±27.32; 178.3±19.19; 189.3±8.57; 172±33.59; 177±29.62 and 177±21.14 g for groups 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 respectively. After the induction of the wounds, the rats of all groups showed losses in their body mass compared to group 1. These losses were significant in all of the different batches ($p = 0.0046$). After 5 weeks treatment of the rats, the results showed significant decreases in weight gains of rats of all groups except those of group 10, especially on the last three weeks of the experiment. Indeed, the treatment of rats with TAESg by cutaneous and oral routes (Group 10) promoted to an increase in the weight gain of the animals of this group making their weight statistically identic to those of group 1 (Figure 1C).

Macroscopic evaluation of the healing process using scoring methods
The surfaces of the wounds of the treated rats were represented by the photographs in figures 2 and 3. Macroscopic observations showed a higher reduction in the surface of the wounds of the animals treated with TAESg regardless the route of administration compared to rats treated with distilled water. This resulted in a

decrease in burn scores correlated with that of inflammation scores during the treatment period. On day 0 (D_0) i.e. four days after the induction of the wounds, all the rats of the different experimental batches had a score of 5 for the burning and 12 for the inflammation corresponding to a necrotic wound (Figure 2). Indeed, the burning and inflammation scores, which were respectively 5±0 and 10.17±0.48 for each route of administration of the batches treated with TAESg experienced a highly significant decrease ($p < 0.0001$) to reach 1.47±0.18 for the oral route (Figure 4A), 1.24±0.14 for the cutaneous route (Figure 4B) and 0.47±0.12 for both routes associated (Figure 4C) according to the burn score and 1.32±0.13 for the oral route (Figure 5A), 1.26±0.09 for the cutaneous route (Figure 5B) and 0.83±0.08 for the two associated routes (Figure 5C) compared to the group treated with distilled water whose burn scores were 2.88±0.22; 2.12±0.21; 2.1±0.20 and 4.19±0.52; 5.62±0.20; 5.18±0.19 for the inflammation scores for the oral and cutaneous routes respectively after 35 days treatment of the wounds. Also, the treatments of rats from batches 4, 7 and 10 with TAESg remained effective and did not show any significant difference ($p > 0.9999$) compared to the batches of rats treated with Flukocin® and Baneocin®.

Planimetric evaluation of the healing of the wounds

The analysis of the results showed a significant increase in the percentage of the shrinkage and wound healing rate of rats treated with TAESg compared to those treated with distilled water regardless the routes of administration (Figure 6 and 7). For the oral route (Figure 6 and 7A), the percentage of shrinkage went from 7.88±0.51% with a healing rate of 0.27±0.02 cm^2/4 days on the 4th day to 74.18 ±2.10% with a healing rate of 2.57±0.12 cm^2/4 days on the 35th day. At the cutaneous level (Figure 6 and 7B), the percentage of shrinkage evolved from 5.77±2.10% with a healing rate of 0.21±0.07 cm^2/4 days on the 4th day at 75.38±1.84% with a healing rate of 2.81±0.15 cm^2/4 days on the 35th day. As for the two associated pathways (Figure 6 and 7C), a very highly significant increase ($p < 0.0001$) in the percentage of shrinkage and wound healing rate of rats treated with TAESg compared to rats treated with distilled water was observed. Indeed, it went from 5.99±0.43% with a healing rate of 0.21±0.02 cm^2/4 days on the 4th day to 89.35±0.49% with a healing rate of 3.19 ± 0.02 cm^2/4 days on the 35th day compared to batch 8 which was -2.22 ± 1.41% with a healing rate of -0.08 ± 0.05 cm^2/4 days on the 4th day at 51.04±2.33% with a healing rate of 1.80±0.08 cm^2/4 days on the 35th day. Thus, the evolution of the percentage of shrinkage and the speed of healing at the level of the oral route were statistically identic at the level of the cutaneous route. In addition, the evolution of these two parameters at the level of the oral and cutaneous route presented a significant slow evolution compared to that of the oral route associated with the cutaneous route.

DISCUSSION

The present study was undertaken to verify the efficacy of the total aqueous extract of *S. gabonensis* stem bark (TAESg) on extensive burn-induced second-degree wounds in Wistar rats. The results showed that after the induction of burn wounds, there was losses of body mass in animals. After one week treatment, the weight gains were observed in the animals of the groups treated with TAESg regardless of the routes of administration. This change in weight gains was more marked in the animals of the group treated with TAESg by the two routes combined compared to those treated with the extract by the oral or cutaneous routes. The loss of body mass after the induction of wounds could be due to transient acute pain. Indeed, acute pain signals an immediate problem reducing the activity of neurons and causes the central nervous system to lose priority over any other body need.[28, 29] Indeed, during the healing process of the wounds, the haemostatic reaction occurring just before the inflammatory phase requiring the use of many proteins and other substances in reserve in the body to avoid in a short time, the effusion of these blood cells. Similarly, the inflammatory reaction that is accompanied by pain could have an inhibitory activity on the region of the central nervous system, including the hypothalamus, which is involved in many bodily functions such as temperature regulation, hunger, thirst.[30,31] The recovery and evolution of body mass in animals from batches treated with the standard drugs and TAESg would be justified by the probable presence of molecules with properties capable of reducing the time of the inflammatory phase by activating the various factors involved in this reaction. Moreover, the difference that exists in the weight gain of the animals treated with TAESg by the combined route compared to the single routes would be due to the combined effect of the extract which acts on the one hand directly on the wound and indirectly through the blood. These actions can quickly activate or stimulate the central nervous system by reducing pain and thus giving priority to the body's other needs, such as hunger and thirst, because any variation in the quantity of food and water consumed have an impact on weight change. These results are in agreement with those reported by some authors who observed a weight gain in all the rats treated with doses of 3.5; 35 and 350 mg/kg bw after repeated oral administration of TAESg for 28 days.[17] The healing activity of the total aqueous extract of the stem bark of S. *gabonensis* was evaluated via two parameters, the macroscopic aspect using scoring methods and the planimetric aspect through the percentage of shrinkage and the speed of healing sores of the wounds. At the macroscopic level, the results showed a considerable reduction in the scores of burns and that of the inflammation in the rats treated with TAESg. This highly significant decreased, from the 8th day treatment, compared to those treated with the standard drugs would be explained by the presence of certain phytochemicals in the extract which would have antioxidant, anti-inflammatory and above all antimicrobial activities to avoid any kind of wound infection by eliminating

redness, exudates and swellings. It has been mentioned in works done by some authors as well as those of others authors that tannins possess hemostatic activity which would precipitate proteins to stop bleeding.[32,33] However, previous work undertaken by showed that the total aqueous extract of the stem bark of *S. gabonensis* contains catechic tannins and many other active substances such as sterols, flavonoids, polyphenols, alkaloids and saponins.[17] These same authors demonstrated the anti-mycobacterial activity of TAESg on *Mycobacterium ulcerans*.[15] All this would explain the significant healing effect of TAESg. The biological activities of the skin during the wound healing process are due to interaction with various binding proteins. In this process, inflammatory cells promote the migration and proliferation of endothelial cells leading to neovascularization of connective tissue which synthesize extracellular matrices, including collagen, leading to re-epithelialization of the skin.[34] At the planimetric level, the results from the measurements of the surface of the wounds during the treatment period showed an acceleration of the percentage of shrinkage and the speed of healing highly significant from the 8th day treatment in rats which received TAESg compared to controls treated with distilled water. The changes in the percentage of shrinkage and healing speed depend on the nature of the substances administered and could be due to the presence of chemical families such as bergenin, isocoumarin, alkaloids, steroids, flavonoids, catechin tannins, polyphenols, saponosides and of gallic acid detected during the photochemical screening carried out by some authors.[17,35] Indeed, these chemical substances of the extract would be at the origin of a shortening of the inflammatory phase allowing to lead more quickly to the phase of epithelialization and thus accelerating the healing of the wounds. According to some authors, flavonoids increase the migration of fibroblasts, cells responsible for the contractile activity in wounds. The epithelialization of wounds treated with the extract is faster compared to controls.[36] This early epithelialization could be due to the presence of tannins and flavonoids which promote the proliferation and migration of keranocytes. This has been demonstrated by others authors during this work on *Spathodea campanulata* (Bignoniaceae) in the treatment of wounds.[37] The delay in wound healing in control animals treated with distilled water, at the macroscopic level by the scores and at the planimetric level would result from the loss of continuity or from the disturbance of the anatomical and cellular structure of the skin but also failure of one or more stages of the healing process and could be of metabolic, infectious or immune origin.[38,39]

Table I : Scores of the evolution of experimental burns.

Score	Essessment of the healing process
0	Healing is complete, tissue repair is complete
1	Tissue healing is almost complete
2	Remnants of the scab remain, the size of the lesion decreases(reconstitution of the skin)
3	All dead tissue (scabs) is removed, wounds, oozing
4	Necrotic skin is partially removed, ulceration, oozing
5	Necrotic skin completely covers the burned area

Table II : Scores of the evolution of inflammation.

	Size				Swelling				Exudate				Redness			
Scores	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
Signification	Ab	Lo	Mo	Im	Ab	Lo	Mo	Im	Ab	Lo	Mo	Im	Ab	Lo	Mo	IM

Ab: Absent ; Lo: Low ; Mo: Moderate ; Im: Important

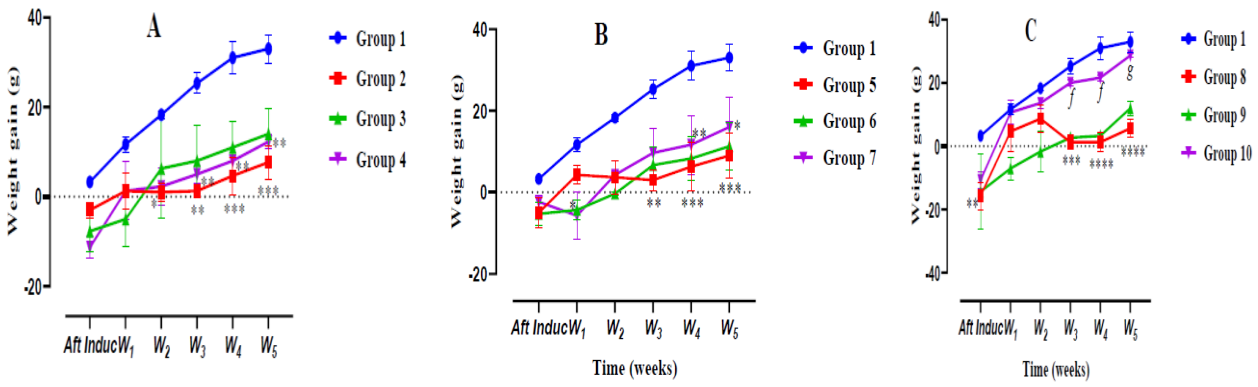

Figure 1 : Weight evolution of the animals during the treatment.

The values are presented as Mean followed by Standard Error on the Mean (M±ESM). A: Oral route; B: Cutaneous route; C: Oral route combined with oral route. Comparison is between group 1 and all treated group ; p< 0.05, *: significant, ** and f: highly significant, *** and g: very highly significant, ****: very very highly significant; Aft Induc: After induction; W1, W2, W3, W4 and W5: week 1, week 2, week 3, week 4 and week 5 respectively.

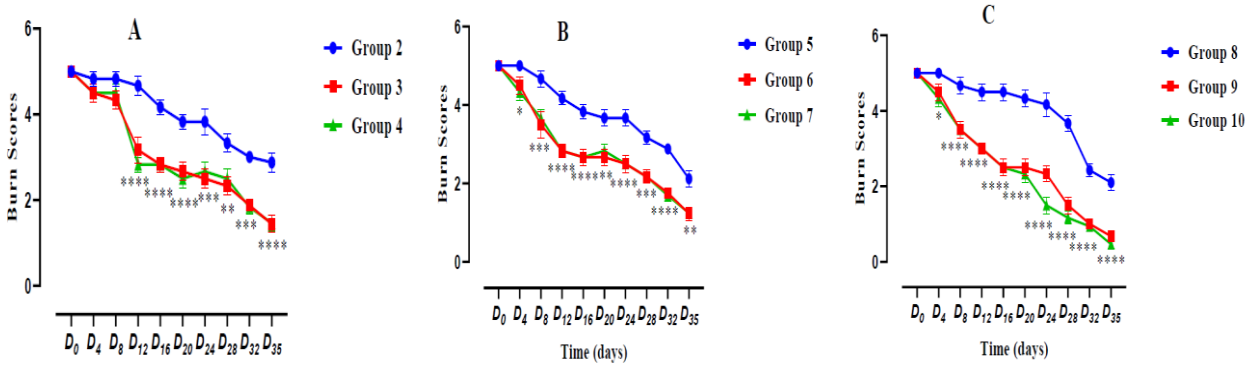

Figure 4 : Evolution of healing as a function of burn scores.

The values are presented as Mean followed by Standard Error on the Mean (M±ESM). A: Oral route; B: Cutaneous route; C: Oral route combined with cutaneous route; Comparison is between group 2,5 and 8 and all group 4, 7 and 10 treated according to routes of administration. p< 0.05, n = 6 , *: significant, **: highly significant, ***: very highly significant, ****: very very highly significant ; ; D0: fourth day after induction; D4, D8, D12, D16, D20, D24, D28, D32 and 35: 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32nd and 35th day of wound care respectively.

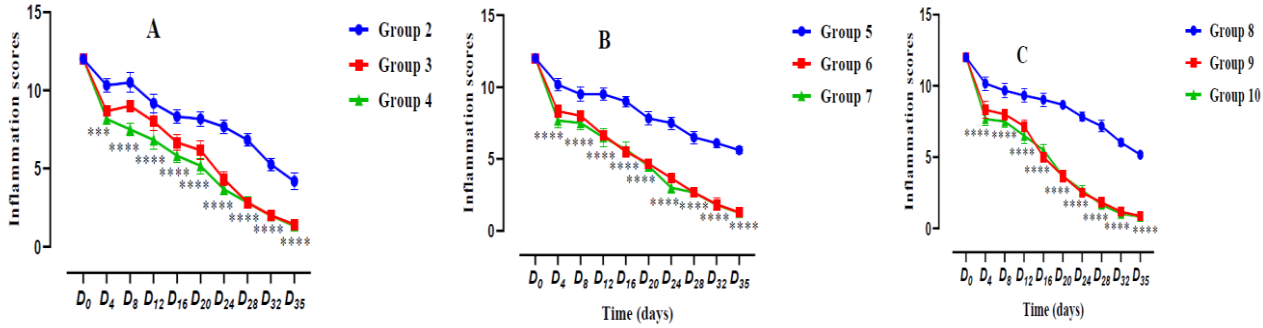

Figure 5 : Evolution of healing as a function of inflammation scores.

The values are presented as Mean followed by Standard Error on the Mean (M±ESM). A: Oral route; B: Cutaneous route; C: Oral route combined with cutaneous route. The comparison is between group 2,5 and 8 and all group 4, 7 and 10 treated by the routes of administration. p< 0.05, n = 6, *: significant, **: highly significant, ***: very highly significant, ****: very very highly significant; D0: fourth day after induction; D4, D8, D12, D16, D20, D24, D28, D32 and 35: 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32nd and 35th day of wound care respectively

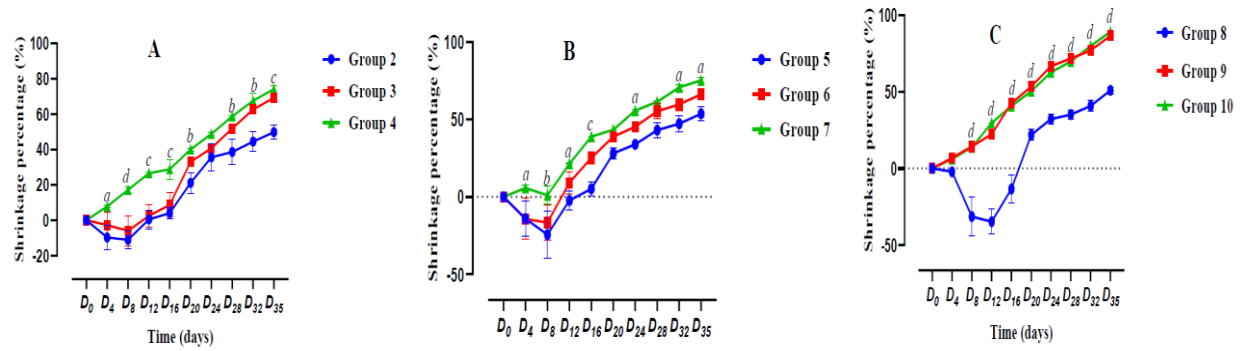

Figure 6 : Percentage of wound shrinkage.

The values are presented as Mean followed by Standard Error on the Mean (M±ESM). A: Oral route; B: Cutaneous route; C: Oral route combined with cutaneous route. The comparison is between group 2,5and 8 and group 4, 7 and 10 treated according to the routes of administration. p< 0.05, n = 6 , a: significant, b highly significant, c: very highly significant, d: very very highly significant; ; D0: fourth day after induction; D4, D8, D12, D16, D20, D24, D28, D32 and 35: 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32nd and 35th day of wound treatment respectively.

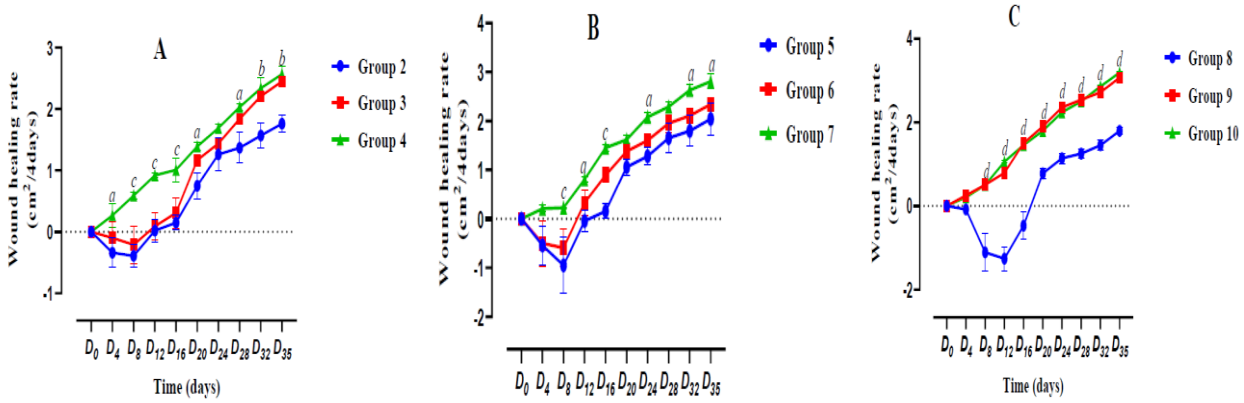

Figure 7 : Wound healing rate.

The values are presented as Mean followed by Standard Error on the Mean (M±ESM). A: Oral route; B: Cutaneous route; C: Oral route combined with cutaneous route. Comparison is between group 2,5and 8 and group 4, 7 and 10 treated according to routes of administration. p< 0.05, n = 6 , a: significant, b highly significant, c: very highly significant, d: very very highly significant; D0: fourth day after induction; D4, D8, D12, D16, D20, D24, D28, D32 and 35: 4th, 8th, 12th, 16th, 20th, 24th, 28th, 32nd and 35th day of wound care respectively.

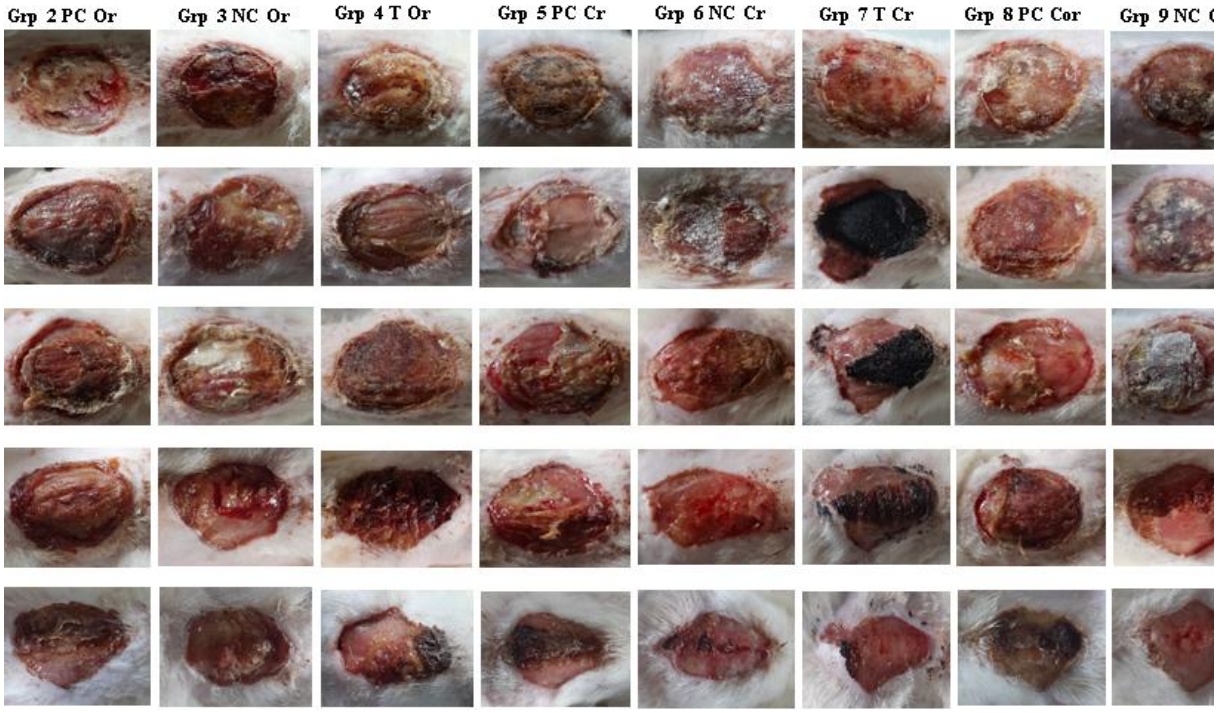

Figure 1 : Evolution of wounds as a function of treatment and time.

Group 1: Untreated rats; Group 2: Rats treated with distilled water orally; Group 3: Rats treated with Flukocin® 14.28 mg/kg bw orally; Group 4: Rats treated with ETASg 3.5 mg/kg bw orally bw orally; Group 5: rats treated with distilled water cutaneous; Group 6: rats treated with Baneocin® 81.6 mg/kg bw cutaneous; Group 7: rats treated with ETASg 5000 mg/kg bw cutaneous; Group 8: rats treated with ETASg 5000 mg/kg bw cutaneous; Group 9: rats treated with ETASg 5000 mg/kg bw cutaneous. cutaneous; Group 8: rats treated with distilled water orally in combination with the cutaneous route; Group 9: rats treated with

Flukocin® at 14.28 mg/kg bw and Baneocin® at 81.6 mg/kg bw orally and cutaneous, respectively. orally and cutaneous, respectively; Group 10: rats treated with ETASg at 3.5 mg/kg bw orally and 5000 mg/kg bw cutaneous; Grp: Group; NoC: normal control; PC: Positive control; T: Test; Or: Oral route; Cr:Cutaneous route;Combined route; D0: before treatment; D4, D8, D12 and D16: days 4, 8, 12 and 16, respectively.

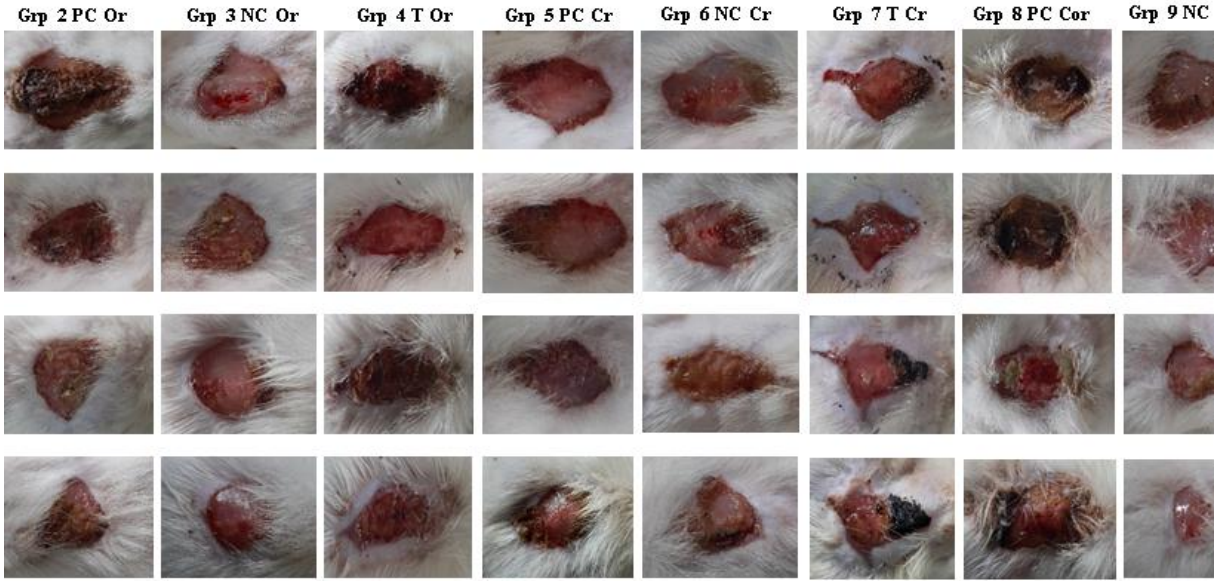

Figure 2 : Evolution of wounds as a function of Treatment and Time (continued).

Group 1: untreated rats; Group 2: rats treated with distilled water orally; Group 3: rats treated with Flukocin® 14.28 mg/kg bw orally; Group 4: rats treated with ETASg 3.5 mg/kg bw orally; Group 5: rats treated with distilled water cutaneous; Group 6: rats treated with Banex® 14.28 mg/kg bw orally. bw orally; Group 5: rats treated with distilled water cutaneous; Group 6: rats treated with Baneocin® 81.6 mg/kg bw cutaneous; Group 7: rats treated with ETASg 5000 mg/kg bw cutaneous; Group 8: rats treated with ETASg 5000 mg/kg bw cutaneous; Group 9: rats treated with ETASg 5000 mg/kg bw cutaneous. cutaneous; Group 8: rats treated with distilled water orally in combination with the cutaneous route; Group 9: rats treated with Flukocin® at 14.28 mg/kg bw and Baneocin® at 81.6 mg/kg bw orally and cutaneous, respectively. orally and cutaneous, respectively; Group 10: rats treated with ETASg at 3.5 mg/kg bw orally and 5000 mg/kg bw cutaneous; Grp: Group; NoC: normal control; PC: Positive control; T: Test; Or: Oral route; Cr:Cutaneous route;Combined route; D20, D24, D28, D32 and D35: days 20, 24, 28, 32 and 35, respectively.

CONCLUSION

It clearly appears, from the results of this research work, that the daily oral and/or cutaneous administration of the total aqueous extract of *Sacoglottis gabonensis* stem bark for 35 days on extensive wounds induced by second-degree burns in rats leads to healing of these wounds. TAESg possesses healing activity by accelerating the process of wound shrinkage and promoting wound closure by the appearance of epithelial tissues. This study scientifically confirms the traditional use of this plant in the treatment of Buruli ulcer in Côte d'Ivoire. However, further studies of this extract need to be done on hemostasis and inflammation.

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