



Study of the Analgesic Potentialities of Aqueous and Hydroethanolic extracts of *Pavetta Corymbosa* (Rubiaceae) Leaves.

MIEZAN Bilé Aka Patrice^{1*}, KOUAKOU Yeboué Koffi François¹, KOFFI Affoué Yvette²,
SERI Seri Chardin².

1. Laboratoire de biochimie, UFR Sciences Biologiques, Université Peleforo Gon Coulibaly BP 1328 Korhogo Côte d'Ivoire.

2. Laboratoire de Constitution et Réaction de la Matière, UFR Sciences de la Sciences de la Structure de la Matière et de la Technologie (SSMT), Université Félix Houphouët Boigny, 22 BP 582 Abidjan 22 Côte d'Ivoire.

ABSTRACT

Pavetta corymbosa (Rubiaceae) is a plant traditionally used in sub-Saharan Africa for the treatment of pathologies such as malaria, pain, diabetes, hemorrhages, bacterial infections and typhoid fever. However, there is no scientific information on its analgesic potential, hence the interest of this study which is to evaluate the analgesic potential of the leaves of this plant which would justify its use in traditional medicine. The analgesic effect of the aqueous and hydroethanolic extracts of *Pavetta corymbosa* at doses of 200 mg / kg of body weight was evaluated by the injection of acetic acid 1% to mice in comparison with paracetamol (reference analgesic) at a dose of 150 mg / kg. The results showed that aqueous and hydroethanolic extracts significantly reduced abdominal contortions in mice ($p < 0.05$). However, the analgesic effect of both types of extracts is comparable to that of paracetamol. Hence the interest in its use in traditional medicine against certain pathologies.

Keywords: *Pavetta corymbosa*, analgesic, aqueous extract, hydroethanolic extract.

*Corresponding Author Email: manjaribobade@gmail.com

Received 10 September 2024, Accepted 20 October 2024

INTRODUCTION

Almost no scientific information on the pharmacological potential of *Pavetta corymbosa* leaves. An analgesic is a drug used for the treatment of pain, caused for example by headaches such as migraines, chronic pain, and pain following surgery¹. In recent years, the world population has become aware that pain management is essential to improve the "comfort" of the patient and therefore to accelerate their recovery². In addition, traditional recipes have proven positive for the treatment of pathologies such as malaria, pain, diabetes, hemorrhages, bacterial infections and typhoid fever with this plant³. Similarly, the aqueous and hydroethanolic extracts of *Pavetta Corymbosa* leaves contain polyphenols, flavonoids, terpenes and sterols⁴. However, the hydroethanolic extract contains quinones in addition to these compounds⁴. These compounds have analgesic potential⁵. It is with this in mind that this plant (*Pavetta corymbosa*)⁶ which is commonly used in popular medicine in African societies has led us to highlight the analgesic virtues of its leaves.

MATERIALS AND METHOD

Plant material

The plant material consists of *Pavetta corymbosa* leaves harvested in the Grand-Bassam area and identified at the National Floristic Center of the Félix Houphouët Boigny University.

Animal material

Adult mice of various sexes of the albino variety (*Mus musculus*) with average weights between 25 and 33g were fasted for 16 hours and then used to test the analgesic properties by intraperitoneally route of aqueous and hydroethanolic extracts of *Pavetta corymbosa* leaves. These mice used are from the animal facility of the Pharmaceutical and Biological Sciences training and research unit of the Félix Houphouët-Boigny University.

Preparation of the two types of extracts

The aqueous extract was prepared from 100 grams of *Pavetta corymbosa* leaf powder in 1 L of boiling distilled water for ten minutes. The solution obtained was filtered through cotton, then under vacuum with Whatman N°4 filter paper. The filtrate obtained was dried in an oven at 40 °C, which constituted the total crude aqueous extract of *Pavetta corymbosa*.

As for the 70% hydroethanolic extract, the Guédé-Guina method⁷ was used. Thus, 100 g of *Pavetta corymbosa* leaf powder were used for this purpose. The resulting mixture was homogenized using a magnetic stirrer for 24 hours.

The solution was filtered through cotton, then under vacuum under the same conditions as before. The filtrate obtained was concentrated in a rotary evaporator and then dried in an oven at

40 ° C. The powder obtained constituted the hydroethanolic extract of *Pavetta corymbosa*.

Evaluation of analgesic activity

This study will be carried out according to the method described by Bhowmick and collaborator⁸ with some modifications. It will consist of inducing an algogenic action by administering acetic acid (1%) to mice, by an intraperitoneally route. This injection induces a sensation of pain which manifests itself in mice by a stretching movement of the hind legs and twisting of the dorso-abdominal musculature, called abdominal cramps⁹. The analgesic effect will be assessed by counting these cramps for 30 min after the injection of the algogenic agent¹⁰. Four homogeneous batches of six animals will be formed. These mice will be of mixed sexes and will be fasted for 16 hours before the experiment.

- Batch 1 (control): The animals in this batch received the solution orally NaCl 9%, 30 min before the injection of acetic acid (1%) intraperitoneally.
- Batch 2: The animals in this batch received orally the dose of 200 mg/kg/pc the aqueous extract of *Pavetta corymbosa* leaves, 30 min before the injection of acetic acid (1%) intraperitoneally.
- Batch 3: The animals in this batch received orally the dose of 200 mg/kg/pc the hydroethanolic extract of *Pavetta corymbosa* leaves, 30 min before the injection of acetic acid (1%) intraperitoneally.
- Batch 4 (reference): The animals in this batch were treated orally with the reference analgesic paracetamol used in therapy, at a dose of 150 mg/kg body weight, 30 min before the injection of acetic acid (1%) intraperitoneally.

The percentage of inhibition of cramps (Pi) is calculated according to the following formula:

$$Pi = [(NCTe - NCTr) / NCTe] \times 100$$

NCTe = Average number of contortions in the control group;

NCTr = Average number of contortions in the treated group

Statistical study

The results were expressed as mean plus or minus standard deviation (SD) on the mean (mean $\pm$ SD). The data representation was carried out using Graph Pad Prism 5.0 software (Microsoft USA). The analysis of the results was carried out using the analysis of variances (ANOVA ONE WAY). The differences between the means were determined according to the Dunnett test, $p < 0.01$: (very significant difference) and $p < 0.05$: (significant difference).

RESULTS AND DISCUSSION

Analgesic activity

The aqueous and hydroethanolic extracts of *pavetta corymbosa* leaves at doses of 200 mg / kg bw reduced the number of contortions compared to the control group respectively 23.25% and 46.66%. Paracetamol (150 mg/kg bw) reduced the pain induced by acetic acid by 24.55% (Table 1). The analgesic effect of the hydroethanolic extract is significantly superior to those of paracetamol and the aqueous extract with $p < 0.05$. However, the analgesic effect of the aqueous extract is similar to that of paracetamol, so there is no significant difference between these two substances in terms of analgesic effect.

Table 1: Analgesic effect of *Pavetta corymbosa* leaf extracts and paracetamol.

Group (n = 6) Distilled	Doses (mg/kg bw)	Number of contortions	Percentage of inhibition (%)
water	-	30.75 ± 0.20	-
Paracetamol	150	23.2 ± 0.28^a	24.55 ^a
Aqueous extract	200	23.6 ± 0.30^a	23.25 ^a
Hydroethanolic extract	200	16.4 ± 0.18^b	46.66 ^b

Each value was the mean $\pm$ SD, N = 6 mice, a and b are letters subscripted to the means for the comparison test. Thus, in each column, values followed by the same letter do not present significant differences at the $p = 0.05$ threshold.

DISCUSSION

The induction of contortions in this study allowed to evaluate the analgesic potential of aqueous and hydroethanolic extracts of *pavetta corymbosa* leaves on a model of abdominal contortions induced by intraperitoneally injection of acetic acid. The administration of acetic acid is an experimental protocol recommended in the biological evaluation of analgesic activities⁸. The pain caused by the administration of acetic acid is due to the release of chemical mediators such as serotonin, histamine, bradykinin¹¹. The analgesic effect of the hydroethanolic extract is superior to that of paracetamol. This result is in agreement with that of Narayana et al¹² who showed in their study that the methanoic extract of *V. congolensis* at 300 mg/Kg of bw had an excellent analgesic power superior to the reference molecule. On the other hand, the analgesic effect of the aqueous extract of *Pavetta corymbosa*, identical to that of the reference molecule, is in agreement with the work of Abdelhak and al¹³ in their study on the reduction of contortions induced by acetic acid by the aqueous extract at 0.4g/L of bw of the aerial part of *Ajuva iva L.* The hydroethanolic and aqueous extracts of *Pavetta corymbosa* contain flavonoids, saponins, polyphenols, polyterpenes and sterols endowed with analgesic potentials which gave them this dressing therapeutic¹⁴. However, that of the hydroethanolic extract is superior to that of the aqueous extract due to the presence of quinones in said extract¹⁵.

CONCLUSION

The results obtained during this study showed that the aqueous and hydroethanolic extracts of the leaves have analgesic properties. However, the hydroethanolic extract showed a more effective activity on pain than the aqueous extract and paracetamol. These results constitute a scientific basis that justifies the traditional use of *Pavetta corymbosa* in the management of pathologies.

ACKNOWLEDGMENT

The authors thank Mr. Ouoplé Clément (UFR of Pharmaceutical and Biological Sciences, Félix Houphouët Boigny University) for his help with the experiments.

ETHICS APPROVAL

The experimental procedures and protocols used in this study were approved by the ethics committee, Health Sciences Committee, Félix Houphouët-Boigny University. These guidelines were in accordance with those of the European Council Legislation 87/607/EEC for the protection of experimental animals. Every effort has been made to minimize animal suffering and reduce the number of animals used.

REFERENCES

1. Kang J, Khan M, Park N, Cho J, Fujii H, Hong Y. 2008. Antipyretic, analgesic, and anti-inflammatory activities of the sea weed *Sargassum fulvellum* and *Sargassum thunbergii* in mice. J. Ethnopharmacol., 116 : 187–190. DOI : <https://www.ncbi.nlm.nih.gov/pubmed/18079077>.
2. Kasonia K, Basegere N, Kaba S, Matamba M, Katsonger M. 1991. Note sur les plantes vulnérables et anti-inflammatoires ? employées en médecine vétérinaire traditionnelle au Zaïre oriental. Belgian J. Bot., 124 : 40–46. DOI : <https://www.em-consulte.com/article/866022/anti-inflammatoires-en-medecine-veterinaire>.
3. Adjanohoun EJ, Aké-Assi L. 1979. Contribution au recensement des plantes médicinales de Côte d'Ivoire. Centre national de floristique de l'Université Nationale de Côte d'Ivoire, Tome 1, p.23–3]
4. Miezan. BAK, Kouamé YY, Kouakou YKF, Kayo B. 2024. Phytochemistry and Evaluation of acute toxicity of Aqueous and Hydroethanolic Extracts of *Pavetta Corymbosa*. Asian Journal of Reserach in Biochemistry Volume 14, Issue 3, page 56-60 ; article no. AJRB 116075.
5. Dohou N. Approche floristique, ethnobotanique, phytochimique et étude de l'activité biologique de thymelaelythroïdes. Thèse de doctorat 2015, P 59. Available on : dspace.univ-tlemcen.dz/bitstream/112/7722/1/ABEDDOU.

6. Adjanooun EJ, Aké-Assi L. 1979. Contribution au recensement des plantes médicinales de Côte d'Ivoire. Centre national de floristique de l'Université Nationale de Côte d'Ivoire, Tome 1, p.23–30.
7. Guédé-Guina F. 1990. Extraction of mansonin from *Mansonia altissima* as cardiovascular agent (Patent application). Ministère de la Recherche Scientifique, Côte d'Ivoire, 35p.
8. Bhowmock R, Sarwar S, Masudur S, Dewan R, Das A, Das B. (2014). In vivo analgesic, antipyretic, and anti-inflammatory potential in Swiss albino mice and in vitro thrombolytic activity of hydro alcoholic extract from *Listsea glutinosa* leaves. *Biology Research*. 47: 1-8pp.
9. Enneb H., Belkadhi A., Cheourb F. Ferchichi A. (2015). Comparaison des composés phénoliques et du pouvoir antioxydant de la plante de henné (*Lawsonia inermis* L.). *Journal of sciences*. 20: 788-793.
10. Attal, N., Bouhassira, D. (2007). Les douleurs neuropathiques. *Arnette*. Vol 1. 15-18pp.
11. Amezour F, Badri W. , Hsaine M., Bourhim N., Fougrach H. (2013). Activity antioxidant and anti-inflammatory activities of Moroccan *Erica arborea* L. *Pathologie Biologie* Volume 61, Issue 6, Pages 254-25.
12. Narayana K.R., Reddy M.S., Chaluvadi M.R., Krishina D.R. (2001). Bioflavonoids classification, pharmacological, biochemical effects and therapeutic potential. *Indian Journal of Pharmaceutical*. 33: 2-16pp.
13. Adelhak. R., Dalila. C., Fairouz. S., Kenza. C. (2012). Comparative study of the antispasmodic activity of the aqueous extract of *Ajuga iva* L and ibuprofen in mice *Ajuga iva* L, *Afique Science* 08 (2) (2012) 131-137.
14. Middleton.E., Kandaswami, C., Theoharidies, T.C. (2000). The effects of plant flavonoids on mammalian cells: implications for inflammation, heart disease and cancer. *Pharmacological. Reviews*, 673-751pp.
15. Srivastava T, Mishra SK. (2015). Novel function of polyphenols in human health: a review. *Res J Phytochem*, 9(3): 116–126p.



AJPHR is
Peer-reviewed
monthly
Rapid publication
Submit your next manuscript at
editor@ajphr.com / editor.ajphr@gmail.com