International Journal of Pharmaceutical Science Invention
ISSN (Online): 2319 – 6718, ISSN (Print): 2319 – 670X
www.ijpsi.org Volume 7 Issue 4 Ver. I ǁ April 2018 ǁ PP.66-68

Source and Pharmacological Activities Of (-)-Anolobine and (+)-Anolobine

Kablan Ahmont Landry Claude[1,2*], Akoubet Ouayogodé Aminata[3], Adiko N'dri Marcelline[3], Kabran Aka Faustin[2], Aka Any-Grah Sandrine[4], Tuo Awa Nakognon[4], Atoli Adjougoua Leopold[3], Konan Dibi Jacques[2], Touré Abdoulaye[5], Attioua Koffi Barthélemy[2], Konaté Fandia[6], Ziao Nahossé[6]

[1]UFR des Sciences Biologiques, Université Peleforo Gon Coulibaly, BP 1328 Korhogo, Côte d'Ivoire.[2]Laboratoire de Chimie Organique et de Substances Naturelles, UFR Sciences des Structures de la Matière et Technologie, Université Félix Houphouët-Boigny, 22 BP 582 Abidjan 22, Côte d'Ivoire.[3]Laboratoire de Pharmacognosie, Botanique, Biologie végétale et Cryptogamie, UFR des Sciences Pharmaceutiques et Biologiques, Université Félix Houphouët-Boigny, 22 BP 714 Abidjan 22, Côte d'Ivoire.[4]Laboratoire de pharmacie galénique, cosmétologie et législation, UFR des Sciences Pharmaceutiques et Biologiques, Université Félix Houphouët-Boigny, 22 BP 714 Abidjan 22, Côte d'Ivoire.[5]Laboratoire de Biotechnologie et Valorisation des Agroressources, UFR Sciences Biologiques, Université Peleforo Gon Coulibaly, BP 1328 Korhogo, Côte d'Ivoire.[6]Laboratoire de Thermodynamique et Physicochimie du milieu, Université Nangui Abrogoua, UFR-SFA, 02 BP 801 Abidjan 02, Côte d'Ivoire.
**Corresponding Author: Kablan Ahmont Landry Claude,*

ABSTRACT: Many species of Annonaceae, Magnoliaceae, Lauraceae and Menispermaceae are used in African traditional medicine. Two molecules, (-)-anolobine and (+)-anolobine, previously isolated from eleven species of Annonaceae, two Magnoliaceae, one Lauraceae and one Menispermaceae, present antibacterial, antileishmanial, trypanocidal, antiplasmodial and anti-acetylcholinesterase activities. This article provides an overview of sources and the pharmacological functions of (-)-anolobine and (+)-anolobine.

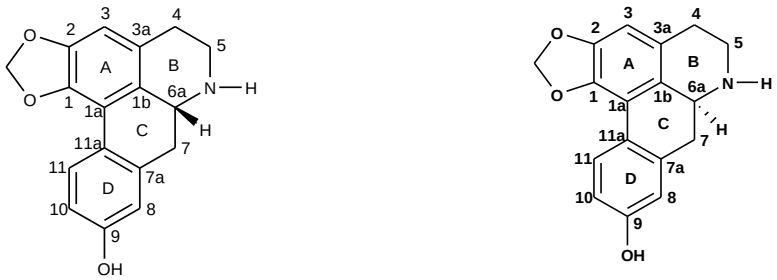
KEYWORDS: (-)-anolobine, (+)-anolobine, Annonaceae, Magnoliaceae, Lauraceae, Menispermaceae

---

Date of Submission: 11-06-2018 Date of acceptance: 26-06-2018

I. INTRODUCTION

Various constituents from Annonaceae, Magnoliaceae, Lauraceae and Menispermaceae are used for medical purposes [**1**,**2**,**3**,**4**,**5**]. In our previous study [**2**] we had identified two aporphine alkaloids from *Monodora brevipes* Benth. (Annonaceae). They were identified as (-)-anolobine and (+)-anolobine (**Fig.1**). These aporphine alkaloids had been also isolated from several plants with interesting and varied biological and pharmacological activities, including antibacterial, antileishmanial, trypanocidal, antiplasmodial and anti-acetylcholinesterase (**Table 1**). In this study, we focus on the part of plants where (-)-anolobine and (+)-analobine had been isolated and on their biological and pharmacological activities.



(-)-anolobine (+)-anolobine

Figure 1: Chemical structures of (-)-anolobine and (+)-anolobine

II. DISCUSSION

(-)-anolobine and (+)-anolobine had been previously isolated from several species of Annonaceae (*Annona cherimola; Annona glabra; Annona squamosa; Asimina triloba; Duguetia obovata; Fissistigma oldhamii; Goniothalamus amuyon; Guatteria goudotiana; Monodora brevipes; Monodora crispata; Polyalthia acuminata*) [**1**,**6**,**7**,**8**,**9**,**10**,**11**,**12**], Magnoliaceae (*Magnolia coco*; *Michelia champaca*) [**13**,**14**], Lauraceae (*Actinodaphne macrophylla*) [**15**] and Menispermaceae (*Stephania cepharantha*) [**16**]. Analogues of these compounds were also described in *Monodora junodii* [**17**], *M. tenuifolia* [**18**] and *Monodora angolensis* [**19**]. Indeed, aporphines are considered as strong chemotaxonomical markers of Magnoliales, deriving from (S)-reticuline, with or without inversion of the configuration at C-6a along their biogenetic pathway, as evidenced by the enantiomeric compounds (-)-anolobine and (+)-anolobine. Both series of enantiomers were encountered concomitantly in other *Monodora* species such as *M. junodii* [**17**]. Concerning (-)-anolobine and (+)-anolobine, they are found in several parts of plants (stem barks, leaves, roots, woods and branches). They possessed varied biological and pharmacological activities (antibacterial, antileishmanial, trypanocidal, antiplasmodial and anti-acetylcholinesterase) [**2**,**12**,**15**,**20**].

Table 1: (-)-anolobine and (+)-anolobine isolated from plants and its pharmacological effects.

Sources	**Pharmacological effects**
Annonaceae *Annona cherimola*; *Annona glabra*; *Annona squamosa*; *Asimina triloba*; *Duguetia obovata*; *Fissistigma oldhamii ; Goniothalamus amuyo*; *Guatteria goudotiana*; *Monodora brevipes*; *Monodora crispata*; *Polyalthia acuminata* **Magnoliaceae** *Magnolia coco*; *Michelia champaca* **Lauraceae** *Actinodaphne macrophylla* **Menispermaceae** *Stephania cepharantha*	Antimicrobial; antiplasmodial; antiacetylcholinesterase; antileishmanial; trypanocidal

Table 2: Sources and parts of plants where (-)-anolobine and (+)-anolobine are isolated.

Plants	**Part of plant**	**Compounds**	**Pharmacological effects of (-) anolobine or (+)-anolobine**
Actinodaphne macrophylla	Stem barks	anolobine (U*)	Antiplasmodial; antimicrobial
Annona cherimola	Stem barks	(-)-anolobine	NT*
Annona glabra	Leaves	(-)-anolobine	Anti-acetylcholinesterase
Annona squamosa	Roots	anolobine (U)	NT
Asimina triloba	Stem barks	anolobine (U)	NT
Duguetia obovata	Stem barks	(-)-anolobine	NT
Goniothalamus amuyon	Woods	(-)-anolobine	NT
Guatteria goudotiana	Stem barks	(-)-anolobine	NT
Monodora brevipes	Leaves	(-)-anolobine	Antileishmanial; trypanocidal
Monodora crispata	Leaves	(-)-anolobine; (+)-anolobine	Antileishmanial;trypanocidal Antileishmanial;trypanocidal
Polyalthia acuminata	Barks and leaves	anolobine (U)	NT
Fissistigma oldhamii	Woods	(-)-anolobine	NT
Magnolia coco	Stem barks	anolobine (U)	NT
Michelia champaca	Branches	(-)-anolobine	NT
Stephania cepharantha	Roots	anolobine (U)	NT

*U: unspecified; NT: Not tested

III. ANTIMICROBIAL ACTIVITY

Anolobine was the most active compound against gram positive bacteria with MIC_{90} between 12 and 50 mg/L. It also showed activity against *Mycobacterium phlei* (MIC 6-25 mg/L). The action against susceptible microorganisms was bactericidal [**20**]. Anolobine induced chromosomal aberrations at relatively low concentrations as low as 2.5µg/mL.

IV. ANTIPLASMODIAL ACTIVITY

Anolobine isolated from the barks of *Actinodaphne macrophylla* demonstrated *in vitro*, antiplasmodial activity against *Plasmodium falciparum* 3D7 with IC_{50} value of 1.38 µM, comparable with the reference standard, chloroquine [**15**].

V. ANTIACETYLCHOLINESTERASE ACTIVITY

(-)-anolobine isolated from *Annona glabra* leaves showed moderate inhibitory activity against acetylcholinesterase with IC_{50} value of 22.4 µM [**12**].

VI. ANTIPROTOZOAL ACTIVITY (Antileishmanial and Trypanocidal activities)

(-)-anolobine had shown varied levels of antiprotozoal activity against *L. donovani* promastigotes (IC_{50} = 19.21 µM) and *T. brucei brucei* trypomastigotes (CL_{100} = 114.95 µM) as well as (+)-anolobine (IC_{50} = 14.59 µM against *L. donovani* promastigotes) and (CL_{100} > 200.00 µM against *T. brucei brucei* trypomastigotes) [**2**].

VII. CONCLUSION

The investigation of the biological properties of (-)-anolobine and (+)-anolobine, both previously isolated from natural source, has revealed their interesting pharmacological functions. Among these pharmacological functions, antibacterial, antileishmanial, trypanocidal, antiplasmodial, antiacetylcholinesterase and antimicrobial effects were revealed. However, there is lack of correlation between *in vitro* and *in vivo* studies on the effects of (-)-anolobine and (+)-anolobine. Toxicity and cytotoxic studies are missing too. For this reason, extensive pharmacological, chemical experiments and metabolism studies should be undertaken. Last but not least, this article aims to provide useful informations about (-)-anolobine and (+)-anolobine for researchers in this field.

ACKNOWLEDGEMENT

We wish to thank the Ministry of Research of the republic of Côte d'Ivoire for the financial support.

REFERENCES

[1]. Kablan L., Dade J., Okpekon T., Roblot F., Djakouré L.A., Champy P. Alkaloids from the leaves of *Monodora crispata* Engl. and Diels and *M. brevipes* Benth. (Annonaceae). *Biochem. System. Ecol.*, 2013, 46, 162-165.
[2]. Dade J., Kablan L., Attioua B., Bories C., Bamba E. H. S., Mensah M., Komlaga G. Antileishmanial and Trypanocidal Activities of extracts and aporphine alkaloids isolated from *Monodora* Genus (Annonaceae). *J. Pharmacogn. Nat. Prod*., 2017, 3, 2. DOI: 10.4172/2472-0992.1000136.
[3]. Dade J. M. E., Coulibali S., Kouamé B. K. F. P., Kablan A. L. C., Kodjo C. G., Zon D., Akoubet A., Adiko M., Aka A.-G. S., Kablan R. J.-F., Djakouré A. L., Attioua K. B. A new natural indole and three aporphine alkaloids from *Monodora bevipes* Benth. (Annonaceae). *Int. Curr. Pharm. J.*, 2017, 6, 7, 40-43.
[4]. Nishiyama Y., Moriyasu M., Ichimaru M., Iwasa K., Kato A., Mathenge S. G., Mutiso P.B.C., Juma F.D. Quaternary isoquinoline alkaloids *Xylopia parviflora*. *Phytochemistry*, 2004, 65, 939-934.
[5]. Dje B. M. G., Kabran G. R. M., Ouattara Z. A., Kadja A. B., Mamyrbekova B. J. A., Bekro Y.-A. Variabilité de la composition organique des huiles essentielles extraites d'organes de *Monodora tenuifolia* provenant de trois sites de récolte en Côte d'Ivoire. *Bull. Soc. Roy. Sc. Lièg.*, 2016, 85, 17-29.
[6]. Manske R. H. F. The Alkaloids: Chemistry and Physiology. Revue canadienne de recherche, 1938,16b, 3, 76-80.
[7]. Roblot F., Hocquemiller R., Cavé A., Moretti C. Alcaloïdes des Annonacés, XLIV. Alcaloïdes de *Duguetia obovata* .*J. Nat. Prod*., 1983, 46, 6, 862–873.
[8]. Sheng-T. L., Yang-C.W., Shiow-P.L. Alkaloids of *Formosan Fissistigma* and *Goniothalamus* species. *Phytochemistry*, 1985, 24, 8, 1829-1834.
[9]. Chung-Y. C., Chang F.-R., WuY.-C.The Constituents from the stems of *Annonacherimola*.*J. chin. chem. soc.*, 1997, 44, 3, 313-319.
[10]. Padmaa M. P., Khosa R. L. Phytoconstituents from the genus *Polyalthia*-a review. *J. Pharm. Res.*, 2009, 2, 4, 594-605.
[11]. Neha P., Dushyant B. Phytochemical and pharmacological Review on A. *squamosal* Linn., *Int. J. Res. Pharm. Biom. Sci.*, 2011, 2, 4, 1404-1412.
[12]. Lee S.S., WuD. Y., Tsai S.F, Chen C.K. *Nat. Prod. Commun*., 2015, 10,6,891-893.
[13]. Manske R. H. F. The Alkaloids: Chemistry and Physiology. Department of Chemistry, University of Waterloo, Waterloo, Ontario, Canada.Academic Press. New York. London. A Subsidiary of Harcourt Brace Jovanovich, Publishers, 1973, Volume XIV. 541.
[14]. Yeh Y.T., Huang J.C., Kuo P.L., Chen C.Y. Bioactive constituents from *Michelia champaca. Nat. Prod. Commun*., 2011, 6, 1251-1252.
[15]. Fadaeinasab M., Taha H., Fauzi P.N., Ali H.M., Widyawaruyanti A. Anti-malarial activity of isoquinoline alkaloids from the stem bark of *Actinodaphne macrophylla*. *Nat. Prod. Commun.*, 2015, 10, 1541–1542.
[16]. Deepak K. S., Ruchi B., Ravindra S., Sudhir K. K., Gur J. P. S., Usha. The genus *Stephania* (Menispermaceae): Chemical and pharmacological perspective. *Journal of Ethnopharmacology*, 2010, 132, 369–383.
[17]. Nishiyama Y., Moriyasu M., Ichimura M., Iwasa K., Kato A., Mathenge S. G., Chalo Mutiso P. B., Juma F. D.Antinociceptive effects of the extracts of *Xylopia parviflora* bark and its alkaloidal components in experimental animals. *Nat. Med*., 2010, 64, 1, 9-15.
[18]. Spiff A. I., Duah F. K., Slatkin D. J., Schiff Jr. P.L. Alkaloids of *Monodora tenuifolia*. *Planta Med*., 1984, 50, 455.
[19]. Lebœuf M., Cavé A., Bhaumik P.K., Mukherjee B., Mukherjee R. The phytochemistry of the Annonaceae. *Phytochemistry*, 1982a, 21, 2783.
[20]. Villar A., Mares M., Rios J.L., Canton E., Gobernado M. Antimicrobial activity of benzylisoquinoline alkaloids. *Pharmazie*, 1987,42,4, 248-250.

Kablan Ahmont Landry Claude." Source and Pharmacological Activities Of (-)-Anolobine and (+)-Anolobine " International Journal of Pharmaceutical Science Invention(IJPSI), vol. 07, no. 04, 2018, pp. 66-68.