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Anti-inflammatory activities of the methanol extracts and an isolated furanoditerpene constituent of *Sphenocentrum jollyanum* Pierre (Menispermaceae)

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Abstract

Sphenocentrum jollyanum crude extracts and an isolated constituent were evaluated for anti-inflammatory activity using the carrageenan-induced hind paw oedema of healthy adult albino rats and utilizing the oral route of administration. The fruit methanol extract (79.58% inhibition at 200 mg kg^{-1}) gave a higher anti-inflammatory activity than the root extract (53.75% inhibition at 200 mg ml^{-1}). Further purification of the most active fruit methanol extract (MFE) led to the isolation of three furanoditerpenes identified as columbin, isocolumbin, fibleucin (uv, ir, nmr and ms) as well as a flavonoid-rich fraction (FDE). Both columbin (67.08% inhibition at 20 mg kg^{-1}, $p < 0.05$) and FDE (76.25% inhibition at 200 mg kg^{-1}; $p < 0.05$) gave significant anti-inflammatory activities in comparable range with reference acetylsalicylic acid (72.50% inhibition at 100 mg kg^{-1}). The results provide some justification for the folkloric uses of *Sphenocentrum jollyanum* in the treatment of inflammatory-based diseases across the West African sub-region.

Keywords: *Sphenocentrum*; Menispermaceae; Anti-inflammatory; Furanoditerpenes

1. Introduction

Sphenocentrum jollyanum Pierre belongs to the family Menispermaceae and is known locally in Yoruba as Akerejupon. It is a small erect sparsely branched shrub or small tree up to 1.2 m with glabrous leaves and bright orange fruits. The roots are bright yellow with a sour taste while the ovoid-ellipsoid bright yellow or orange fruits occur in clusters and are edible when ripe (Neuwinger, 1996). It is mostly found in the forest zones of Southern Nigeria as undergrowth plant where the roots are used as chewing sticks, relief for constipation and as a stomachic. It is prepared with *Piper guineense* and mixed with lime juice for use as a cough medicine. All the morphological parts are prominent ingredients in several recipes for the management of sickle cell disease. The root hair is used with other anti-malarial plants as remedies against fevers and body pains and rheumatism while leafy twigs and fruits have been reportedly used for its aphrodisiac activity (Burkill, 1985; Iwu, 1993). Although scientific data on *Sphenocentrum jollyanum* is very scanty, our group has recently reported the anti-viral activity of the chloroform and methanol extracts of this plant on cowpea mosaic and polio viruses (Moody et al., 2002a, 2002b). The main objective of the present study is to evaluate the anti-inflammatory potential of the extracts and an isolated constituent of *Sphenocentrum jollyanum* using the in vivo experimental oedema model in rats in view of the importance attached to this plant for the treatment of rheumatic pains in the local communities in the South Western Nigeria.

2. Materials and methods

2.1. General experimental procedures

UV spectra were recorded on Perkin-Elmer UV/VTS spectrophotometer, NMR spectra were recorded on Brucker DPX-

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400 spectrometer operating at 400 MHz for ^{1}H NMR and 100 MHz for ^{13}C NMR using TMS as internal standard. Spectra were measured in $CDCI_3$ and DMSO-d_6.TLC was performed on pre-coated silica gel 60 F_{254} plates 0.25 mm (Merck).

2.2. Plant materials

The root and fruits of *Sphenocentrum jollyanum* were collected within the University of Ibadan campus and authentication was done at the Forestry Research Institute of Nigeria, (FRIN) Ibadan, where voucher specimen (FHI105364) is deposited.

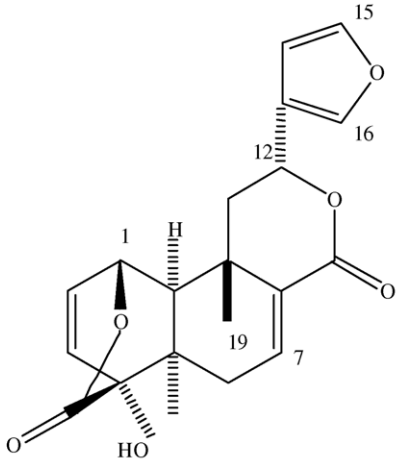
The plant samples were dried in the shade, comminuted into coarse powders and then used for the preparation of the extracts for this study.

2.3. Extraction, purification and isolation of constituents

Dried powdered fruit and root samples (2 kg each) of *Sphenocentrum jollyanum* were separately extracted, using cold percolation method with methanol for 72 h each. The extracts were separately filtered and evaporated on a rotavapour under reduced pressure to give a viscous mass (108.2 and 84.2 g) of fruit and root methanol extracts, respectively. A portion of the MeOH fruit extract (10 g) was subjected to silica gel vacuum liquid chromatographic separation with hexane with an increasing percentage of ethylacetate and then methanol, as eluents. Four hundred millilitres fractions (A, hexane:ethylacetate 5:95; B, ethylacetate 100%; C, hexane methanol 1:1; D, methanol 100%) were collected. Further purification of fraction B using preparatory thin-layer chromatography (silica gel, $CHCI_3$:MeOH 7:3) resulted in the isolation of three furanoditerpenes namely, columbin (**1**), isocolumbin (**2**), fibleucin (**3**) and a flavonoid-rich fraction (FDE). Aliquots of the extracts and compounds were dissolved in normal saline containing 3% (w/v) Tween 80 as and when needed for the experiments.

2.4. Animals

Adult albino rats weighing 150–180 g used in the present study were obtained from the Animal house of the Department of Biochemistry, University of Ibadan. The animals were



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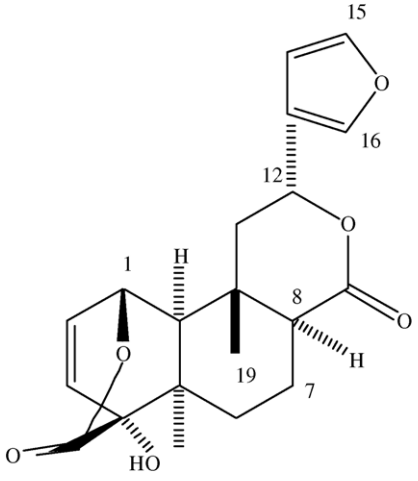

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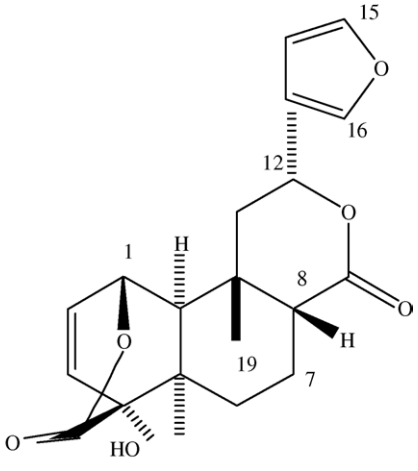

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Fig. 1. Structures of isolated furanoditerpenes from *Sphenocentrum jollyanum* fruit columbin (**1**), isocolumbin (**2**) and fibleucin (**3**).