Original Research Article

Phaeophytin a and Triterpenoids from *Brachystelma Togoense* Schltr, a Nigerian Medicinal Herb

ABSTRACT

The medicinal herb, *Brachystelma togoense* schtlr (Apocynaceae) was used traditionally for treatment of ailments. From the MeOH and CH_2Cl_2 extracts of *Brachystelma togoense,* phaeophytin a (**1**), α-amyrin (**2**) and lupeol (**3**) respectively were isolated and identified as the secondary metabolites from this plant. The structures were elucidated using ^{1}H, ^{13}C and 2D NMR. These phytochemicals have shown to possess various biological activities such as anti-inflammatory, anti-fungal, anti-inflammatory and anti-cancer. Therefore, the uses of *Brachystelma togoense* for medicinal purpose in Nigeria were due to the presence of these compounds.

Keywords: Secondary metabolites; phaeophytin a; α-amyrin; lupeol; *Brachystelma togoense* schtlr

1. INTRODUCTION

Brachystelma was first described by Robert Brown in 1822. The genus *Brachystelma* R. Br. (Apocynaceae: Asclepiadoideae) is represented by about 100-120 species (1). The genus *Brachystelma* is chiefly distributed in South Africa, South-East Asia and Australasia (2). A total of 18 species are known in India (3) and out of them, 3 species in Maharashtra. It is an erect perennial herb, growing up to 30 cm, recorded from Ghana to Nigeria, in lowlands to montane situations. The tuber is said to be edible raw (4). Many of the tuberous *Brachystelma*

are known to be used medicinally for the treatment of headache, stomach ache and colds in children.

2.MATERIAL AND METHOD

2.1 Collection

The aerial parts of *Brachystelma togoense* was collected in April 2018 from Ugbokolo forest, in Okpokwu local government area of Benue State-Nigeria. The plant was authenticated by Mr. Namadi Sanusi and a voucher specimen 25856 had been retained at the Department of Biological Sciences, Ahmadu Bello University, Zaria-Nigeria (Figure 1).

2.2 General experimental procedure

NMR spectra were recorded in CD_3OD or $CDCl_3$ on a 400MHz or 500 MHz Bruker AVANCE III NMR instrument at room temperature. HREIMS were recorded on an Agilent Technologies 6550 iFunnel Q-TOF LC/MS with samples dissolved in CH_2Cl_2. Optical rotations were determined in CH_2Cl_2 on a JASCO P-1020 polarimeter and the infrared spectra were recorded using a Perkin-Elmar (2000 FTIR) spectrometer on NaCl plates.

2.3 Extraction and isolation

Air dried *B. togoense* (1000 g) was extracted on a shaker at room temperature successively with 100 % CH_2Cl_2 and 100 % CH_3OH for 72 h with each solvent. The extracts were concentrated using rotary evaporator at 40 ^oC to a yield brown gum (32 g) The CH_2Cl_2 extract (32 g) was separated by flash chromatography (Biotage) over silica gel using three solvents, first with a hexane/ CH_2Cl_2 step gradient starting with 100 % hexane and gradually increasing the polarity to 100 % CH_2Cl_2. Secondly, CH_2Cl_2/EtOAc from the last concentration (100 % CH_2Cl_2) to 50 % EtOAc and to 100 % EtOAc to yield compounds **1** (51.0 mg), **2** (32.0 mg) and **3** (28.0 mg).

4. Results and Discussion

The air dried aerial parts *B. togoense* (1000 g) collected at Ugbokolo forest, Okpokwu local government area of Benue State-Nigeria, were extracted with dichloromethane and methanol. A combination of flash chromatography (biotage system), column chromatography and thin-layer chromatography of these extracts yielded 1 (51.0 mg; 0.16 %), 2 (32.0 mg; 0.10 %) and 3 (28.0 mg; 0.09 %). The known compounds 1-3 (Figure 2) were elucidated based on comparison of previous data (5–9). In the past, pheophytin a has been reported to possess strong antimicrobial activity against *C. albicans* (ATCC 90028) and *C. albicans* (ATCC 76615) (10) as well as antioxidant activity (11). α-amyrin has been reported to exhibit antimicrobial activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, *Staphylococcus aureus* and *Trichophyton mentagrophytes* (12). Antiprotozoal, anti-inflammatory, antitumor and antimicrobial activity had been reported for lupeol (13).

Conclusion

In conclusion, this was first record about phytochemical analysis of *B. togoense*. These secondary metabolites phaeophytin a (**1**), α-amyrin (**2**) and lupeol (**3**) were reported to show various biological activities. Therefore, the results of chemical component analysis for *B. togoense* suggested the ethnomedicinal uses of this plant in Nigeria.

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Competing Interests

Authors have declared that no competing interests exist.

Figure 1: *Brachystelma togoense* in its natural habitat (14)

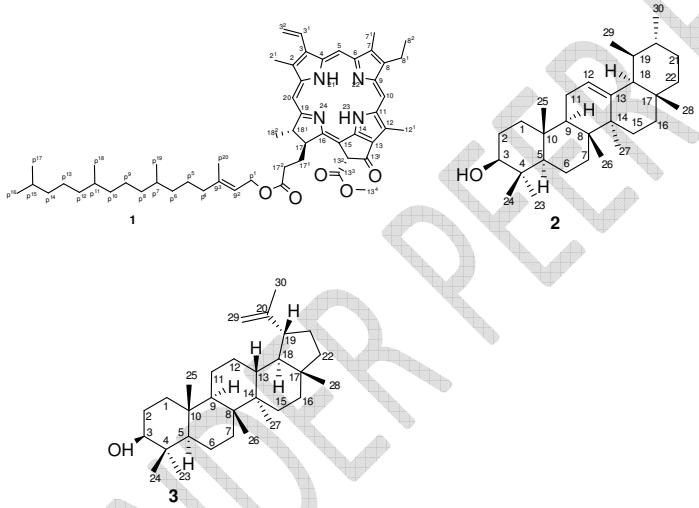

Fig.2: structures of isolated compounds **1-3** from B.togoense schtlr

1. phaeophytin a

2. α-amyrin

3. lupeol

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