



GC-MS analysis of ethanolic extract of *Boswellia dalzielii* Hutch (burseraceae) root from Nigeria

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Abstract The phytochemistry of ethanolic extract of *Boswellia dalzielii* root was carried out using GC-MS. This study is designed at identifying and isolating the major bioactive compounds. Fifteen major compounds were identified namely; Glycerin, Octanoic acid, 6-Pentyl-5,6-dihydro-2H-pyran-2-one, Decanoic acid, Undecanoic acid, *n*-Tetradecanoic acid, 2-methyl-1-octanol, Hexadecanoic acid, *n*-Nonyl fluoride, *Z*-11-Hexadecenoic acid, octyl ether, 13-octadecenal, α , Glycerol 1-palmitate, 2-methyl-*Z,Z*-3,13-octadecadienol, 4-propylheptadecane. This study suggests that *B. dalzielii* root may be antiandrogenic, antifungal, hypocholesterolemic, Flavor, fragrance agent, anti-seizure, anticonvulsant, Laxative, also to treat cerebral edema, rapid and temporary decrease in eye pressure, angina pectoris.

Keywords *Boswellia dalzielii*, root, ethanolic, GC-MS analysis

Introduction

For centuries, herbal medicine has been the basis for medical treatments and such traditional medicine is still widely practiced today. The World Health Organization (WHO) estimated that up to 80% of people over the world still rely on traditional remedies such as herbs for their medicines [1-2]. Modern medicine recognizes herbal medicine as a form of alternative medicine as the practice of herbal medicine is not strictly based on evidence gathered using the scientific method. Modern medicine, however, makes use of many plants-derived compounds as the basis for evidence-tested pharmaceutical drugs and phototherapy works to apply modern standards of effectiveness testing to herbs and medicines that are derived from natural sources.

Boswellia dalzielii Hutch (Burseraceae) commonly known as the frankincense tree grows up to 13 m high and is found mainly in the Savannah region of West Africa; locally abundant in northern Nigeria, Cameroun, and Ubangishari [3]. The Bini called it Eban-arukhoe, Fulani called it Januhi, while the Hausa called it Ararrabi, Basamu and Hanu. The tree has a characteristic pale papery bark that is peeling and ragged usually with small white flowers which may appear while the tree is leafless and are fragrant [4]. The stem bark secretes fragrant white gum that is burnt to fumigate cloth and to drive out flies, mosquitoes from rooms. It has been reported to treat diarrhoea in both human and poultry, many forms of cancers/fibrosis, inflammation, snakebite, arthritis, asthma, microbes, ulcer, syphilis, the stem bark is boiled to make a wash for fever and rheumatism and it is also used as a stomachic while it is taken internally for gastrointestinal troubles [5-10].

Gas chromatography–mass spectrometry (GC-MS) is an analytical method that involves a combination of gas chromatography and mass spectrometry to identify different phytochemicals within a test sample. GC-MS technique has been proved to be a valuable and important method in analyzing fatty acids, non-polar compounds, lipids, volatile essential oil and alkaloids [11-12]. Considering the therapeutic properties of *Boswellia dalzielii*,



ethanolic extract of the root was analyzed using GC-MS. The aim of this study is to determine the major phytocompounds and their therapeutic properties using GC-MS analysis.

Materials and Methods

Collection of Plant Material

The fresh root of *Boswellia dazielii* was collected from Makaya forest, Kibiya Local Government Area, Kano State. The plant was identified by Dr. Timothy of Plant Biology and Biotechnology Department, University of Benin. The roots were chopped, air dried for four weeks and ground to a coarse powder with mortar and pestle.

Preparation of Plant Extract

The dried powder was weighed (100 g) and then macerated in 2.5 litres of Ethanol for 72 hours. The solution of the root was decanted into another flask. The solution was filtered and concentrated at 40 °C by means of a rotary evaporator. The evaporated extract was transferred into an oven at 40 °C and evaporated to dryness for 24 hours. The concentrated extract was transferred into a sample bottle of known weight. The weight of the ethanolic extract was 11.15 g giving a yield of 0.1115 %.

Gas Chromatography–Mass Spectrometry Analysis of Ethanolic Extract *Boswellia dalzielii* root

The GC-MS analysis was done in National Research Institute for Chemical Technology (NARICT), Zaria, Nigeria. The prepared root extract was analyzed using GCMS-QP2010 plus Shimadzu Japan, equipped with a VF-5 ms fused silica capillarycolumn of 30 m length, 0.25 mm diameter, and 0.25 mm film thickness. For GC-MS detection, an electron ionization system with ionization energy of 70 eV was used. Helium gas was used as a carrier gas at a constant flow rate of 1.58 ml/min. injector and mass transfer line temperature were set at 230 and 250 °C respectively. The oven temperature was programmed from 80 to 200 °C at 10 °C/min, held isothermal for 1min and finally raised to 280 °C. Identification of the constituent was achieved by comparison of the mass spectra and those in the library, National Institute of Standard Technology (NIST).

Results

The ethanolic extract of *Boswellia dalzielii* root was analyzed by GC-MS and fifteen major compounds were identified. The information of GC is given in Figure 1. The MS information is listed in Table 1 and 2

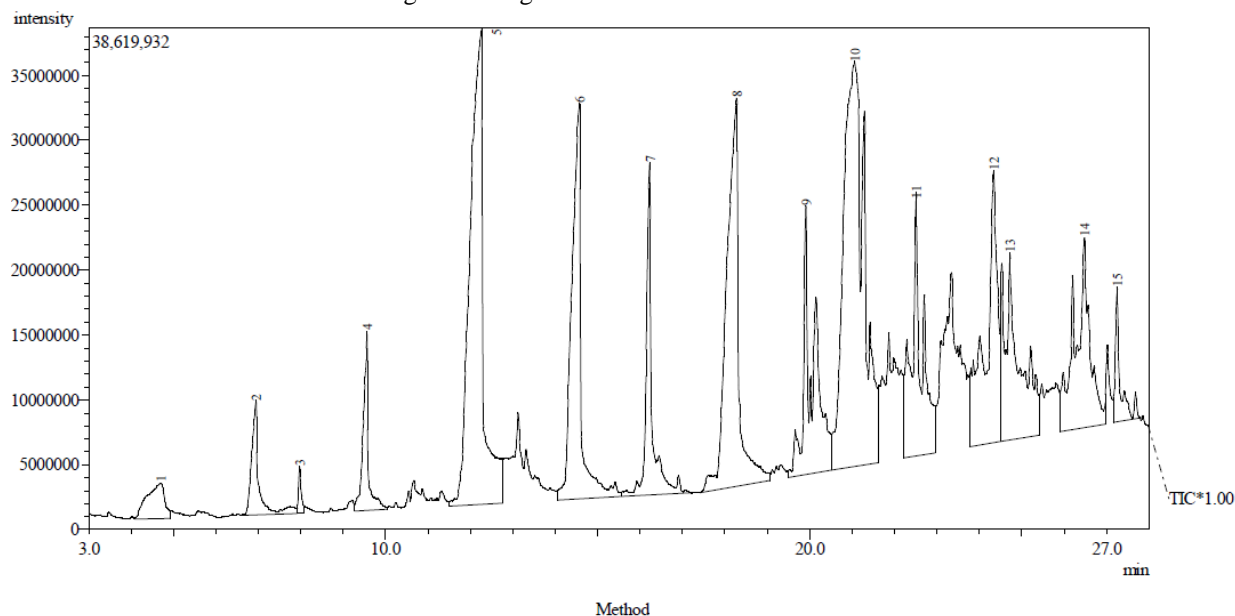


Figure 1: Gas Chromatography of the ethanolic root extract of *Boswellia dalzielii*



Table 1: List of identified phytochemicals of ethanolic extract of *Boswellia dalzielii* root

Peaks	Retention Time(min)	Names of compound	Molecular formula	Molecular weights	Peaks area (%)	Nature of compound	Structures
1.	4.692	Glycerin	C ₃ H ₈ O ₃	92	1.47	Triol	
2.	6.942	Octanoic acid	C ₈ H ₁₆ O ₂	144	1.88	Fatty acid	
3.	7.975	6-pentyl-5,6-dihydro-2H-Pyran-2-one	C ₁₀ H ₁₆ O ₂	168	0.31	Flavonoid fraction	
4.	9.567	Decanoic acid	C ₁₀ H ₂₀ O ₂	172	2.15	Fatty acid	
5.	12.250	Undecanoic acid	C ₁₂ H ₂₂ O ₂	186	15.27	Carboxylic acid	
6.	14.575	n-Tetradecanoic acid	C ₁₄ H ₂₈ O ₂	228	8.91	Myristic acid	
7.	16.225	2-methyl-1- octanol,	C ₉ H ₂₀ O	144	4.54	Ester	
8.	18.283	n-Hexadecanoic acid	C ₁₆ H ₃₂ O ₂	242	11.23	Palmitic acid	
9.	19.908	n-Nonyl Flouride	C ₉ H ₁₉ F	146	6.07		
10.	21.75	Hexadecenoic acid Z-11-	C ₁₆ H ₃₀ O ₂	254	19.97		
11.	22.508	octyl ether	C ₁₆ H ₃₄ O	242	6.14	Antar	
12.	24.342	13-octadecenal,(z)	C ₁₈ H ₃₄ O	266	7.63		
13.	24.725	Glycerol 1- palmitate	C ₁₉ H ₃₈ O ₄	330	6.39	Ester	
14.	26.483	2-methyl-Z, Z-3, 13- octadecadienol	C ₁₉ H ₃₆ O	280	6.46	Linoleic acid	
15.	27.250	4-propylheptadecane	C ₂₀ H ₄₂	282	1.59		



Table 2: Activity of phytochemicals identified in the ethanolic extract of *Boswellia dalzielii* root

S/N	Name of Compound	Activity
1	Glycerin	Laxative, rapid and temporary decrease in eye pressure, bacteriostatic, fuel, excipient for syrups, cerebral edema, angina pectoris.
2	Octanoic acid	Antimicrobial pesticide, ghrelic, medium chain triglyceride (excess calorie burning, and weight loss), algaecide, bactericide, and fungicide.
3	6-pentyl-5,6-dihydro-2H-Pyran-2-one	Antifungal
4	Decanoic acid	Antiseizure, Anticonvulsant
5	Undecanoic acid	Nf
6	n-tetradecanoic acid	Synthesizing flavor, lubricant, food, additive, pharmaceuticals, cosmetics
7	2-methyl-1- octanol,	Flavor and fragrance
8	n-Hexadecanoic acid	Antioxidant, hypocholesterolemic, nematocide, pesticide, lubricant, antiandrogenic, flavor, hemolytic 5-alpha reductase inhibitor.
9	n-Nonyl fluoride	Nf
10	Hexadecenoic acid Z-11-	Nf
11	Octyl ether	Antistatic agent, lubricant, electrical insulator, water repellent
12	13-octadecenal, (Z)	Nf
13	Glycerol 1-palmitate	Tricyglycerol
14	2-methyl-Z,Z-3,13-octadecadienol	Algaecide, antifoulant, dye, fragrance, fumigant, fungicide, herbicide safener, microbiocide, molluscicide, plant growth regulator.
15	4-propylheptadecane	Nf

Nf: Not found

Discussion

This study showed that the ethanolic extract of *Boswellia dalzielii* root was subjected to GCMS analysis and fifteen major phytochemicals were identified namely; Glycerin, Octanoic acid, 6-Pentyl-5,6-dihydro-2H-pyran-2-one, Decanoic acid, Undecanoic acid, n-Tetradecanoic acid, 2-methyl-1- octanol, Hexadecanoic acid, n-Nonyl fluoride, Z-11- Hexadecenoic acid, octyl ether, 13-octadecenal,(z), Glycerol 1- palmitate, 2-methyl-Z,Z-3,13- octadecadienol, 4-propylheptadecane. Several studies have confirmed that glycerin has laxative, a rapid and temporary decrease in eye pressure, bacteriostatic, fuel, excipient for syrups, cerebral edema, angina pectoris properties [7, 13-14]. Decanoic acids have anti-seizure and anticonvulsant properties. Octanoic acid has antimicrobial pesticide, ghrelic, medium chain triglyceride (excess calorie burning, and weight loss), algaecide, bactericide, and fungicide properties [15-17]. Undecanoic acid has Anti-fungal properties. Glycerol 1-palmitate possesses Triacylglycerol. 2-methyl-1- octanol are flavor and fragrance agent. n-Hexadecanoic acid has Antioxidant, hypocholesterolemic, nematocide, pesticide, lubricant, antiandrogenic, flavor, hemolytic 5-alpha reductase inhibitor activities [18-20]. 6-pentyl-5, 6-dihydro-2H-Pyran-2-one has antifungal property [21].

Conclusion

Ethanolic extract of *Boswellia dalzielii* is a promising antioxidant, antiandrogenic, antifungal, hypocholesterolemic, Flavor and fragrance agent, antiseizure and anticonvulsant, Laxative, also to treat cerebral edema, rapid and temporary decrease in eye pressure angina pectoris. However, further investigation is necessary for the development of these plants to treat specific illness.



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