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Characterization of Volatile Components of Epa-Ijebu: A Native Wonder Cure Recipe

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ABSTRACT

Essential oils and volatile compound from Epa-Ijebu, a native cure-all concoction was extracted by hydrodistillation and analyzed using Gas Chromatography/ Mass Spectrometry (GC-MS) in an attempt to determine the major constituents that could be responsible for the acclaimed curative ability of this concoction over diverse illnesses. Twelve major organic compounds were identified of which Fatty acids were most prevalent (35.52%). This was followed by normal alkanes such as nonadecene, hexadecane, heptadecane, octadecane and heneicosane (constituting 26.5%),2-p-nitrophenyl-oxadiazol-1,3,4-one-5 (18.18%), Quinoline (5.96%), Benzothiazole (4.87%) , Alcohol (2.48%) and other compounds in traces. The prevalence of fatty acid extracts as well as quinoline, benzothiazole and alchohol may be responsible for the anti-bacterial and antifungal as well as other curative ability of this local concoction.

Key words: Epa-Ijebu, volatile compounds, medicinal properties

INTRODUCTION

The term folk medicine refers to the knowledge of the mode of treatment or traditional beliefs which is common to a group of rural people. Generally, common ailments in rural areas are treated by some village old people who possess the knowledge of local plants (Sofowora, 1982).

There are several methods by which potent native medicament are prepared by skilled traditional healers. These include concoction (soup, drink etc.), decoction, infusion, maceration etc. Among the Yorubas in the Western Nigeria, the use of a concoction called Epa-Ijebu is very popular. The latter is regarded as a wonder- cure recipe used in treating many disease conditions including snake bites and scorpion stings. The drug is unique in that it is composed of both plants and animal parts.

Initial studies have shown that Epa-Ijebu was active against five common bacterial pathogens than any of twelve crude plant extracts investigated (Adeleye *et al*., 2008a) and was inhibitory to *Mycobacterium tuberculosis* at 0.05 g mL^{-1} (Adeleye *et al*., 2008b). Similarly, its fungicidal properties compared favorably with known antifungals but was found to have a low pH value (3.8) and toxic to laboratory mice at high concentrations (Adeleye *et al*., 2009).

As part of our interest in identifying the potentially valuable therapeutic agents contained in this concoction, this current study was carried out to identify volatile compounds of medicinal importance present in Epa-Ijebu.

MATERIALS AND METHODS

This study commenced in February 2009 and was concluded in July 2009. The wonder cure of Epa-Ijebu was procured in prepared form from herb sellers known as Elewe omo at Mushin market,

a suburb of Lagos, Nigeria. According to information received from local herbalists, the recipe include juice from *Citrus aurantium*, *Citrus aurantifolia*, *Aframomum melenguata*, as well as animal parts including a type of rat *Rattus norvegium,* snake heads (various types) and whole scorpion. All animals' parts are dried and ground into powder. The concoction is prepared by mixing all the ingredients in a large pot and cooked until the materials are reduced by half and allowed to cool. Thereafter, it is dispensed into small bottles and labeled for sale. Small quantities of the paste are added and mixed with pap (a slurry of milled corn prepared and boiled in hot water) and drank. (Adeleye *et al*., 2008a).

Extraction of essential oils and volatile compounds: The essential oil extraction was carried out by using the Hydro-distillation method as adopted by Ajayi *et al*. (2008). The concoction was weighed and dissolved in distilled water in ratio 3:1. This was then transfered into the hydrodistillator and distillation was allowed for 4 h with hexane as the extracting solvent.

Gas Chromatography-Mass Spectrometry (GC-MS) analysis: The Gas Chromatography/ Mass Spectrometry (GC-MS) was carried out using the Agilent system 7890 Gas chromatography, model 5973 mass selective detector (MSD) and an Agilent ChemStation data system. The GC column was an HP -5 ms fused silica capillarywith a 5%phenyl methylpolysiloxane stationary phase. The carrier was helium. Identification of each individual constituent of the volatile compound was obtained based on their retention time and by comparison of their mass spectral fragmentation patterns (NIST data base).

RESULTS AND DISCUSSION

The GC/MS analysis of Epa-Ijebu revealed the presence of a variety of organic compounds ranging from the normal alkanes to aromatic compounds (Table 1). Of the twelve compounds detected, fatty acids were the most abundant (35.52%). The fatty acids identified were n-hexadecanoic acid (34.13%) and octadecanoic acid (1.39%). The alkanes comprised of nonadecene, (9.46%), heptadecane (6.21%), octadecane (4.69%, heptadecane (3.39%)) and heneicosane (2.75%). Other compounds were 2-p-nitrophenyl-oxadiazole-1,3,4-one-5 (18.18%), Benzo(h) quinoline

Table 1: The result of the GC-MS analysis

Group of organic compound	IUPAC name	Retention time	Composition (%)
Fatty Acids	n-hexadecanoic acid	19.269	34.13
,,	9,12,octadecanoic acid	21.182	1.39
Alkanes	Nonadecene	21.255	9.46
,,	Heptadecane	15.861	6.21
,,	Octadecane	17.180	4.69
,,	Hexadecane	14.473	3.39
,,	Heneicosane	15.941	2.75
Ketones	2-p-nitrophenyl-oxadiazole 1,3,4,-one-5	32.511	18.18
Quinoline	Benzo[h]quinoline	32.671	5.96
Thiazole	Benzothiazole	18.070	4.87
Alcohol	Ethanol	18.438	2.48
Others in traces	4-methyl-2-trimethylsilyloxyacetophone, cyclotrisiloxane, 1,2-Benzenediol	33.399	6.39

(5.96%) and Benzothiazole (4.87%). Ethanol was the only alcohol detected (2.48%). Few others including 1-2-Benzenediol appeared in traces (6.39%).

The presence of fatty acids as the major constituents of this crude drug probably explains the observed acidic nature of the drug whose pH was noted to be 3.8. Fatty acids have been observed to be inhibitory to many bacteria and fungi (Agoramoorthy *et al*., 2007). Next in line of abundance are the non-terpenoidal alkanes. The commonality of alkanes as volatile compounds in plants have been documented (Jeevan Ram *et al*., 2006). In a comprehensive study conducted by Dembitsky (2007) more than 260 naturally occurring fatty acids, alkanes and their analogs and derivatives were isolated and identified from plants, algae, fungi and marine invertebrates that demonstrated different biological activities.

Another major volatile compound which may be responsible for the antimicrobial property of Epa-Ijebu is the 2-p-nitrophenyl-oxadiazole-1,3,4-one-5. This compound has been synthesized by Husain and Ajmal (2009) and Chikhalia *et al*. (2009) and was observed to be active against *Staphylococcus aureus* and *Escherichia coli*. In the same vain, the presence of Benzo (h) quinoline may also explain the medicinal properties of Epa-Ijebu. Compounds of the quinoline family are widely used to make drugs, especially antimalaria , fungicides, biocides etc. (Munson *et al*., 1976; Robert *et al*., 2006; Ryu *et al*., 2009). Ethanol, although occurring as less than 3%, is a known antiseptic and its presence obviously contributes to the antimicrobial nature of this crude preparation. Delaquis *et al*. (2002), had attributed antimicrobial activity of eucalyptus essential oils to among other chemicals, presence of alcohols and aldehydes. Other compounds found in traces include benzothiazole, 1-2-Benzenediol etc all of which are aromatic compounds sometimes used in the manufacture of biocides and other pharmaceutical drugs.

This study has revealed that the crude drug Epa-Ijebu is a tandem of naturally occurring bioactive chemical compounds. Considering the variety of medicinal properties of the different constituents of this ethno medicament, its source of potency against diverse ailments can be understood. The anti snake venom which the natives claimed it possess may also be due largely in part to the presence of dried, ground snake heads in the brew which could serve as an antigen to potentiate anti snake venom antibodies.

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