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Chemical compositions of essential oils of *Picralima nitida* seeds

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ABSTRACT

The chemical composition of essential oil obtained from fresh seeds of Picralima nitida by hydrodistillation was analysed by Gas Chromatography-Mass Spectroscopy (GC-MS). A total of forty-three compounds were identified. The main constituents of the oils were sabinene (12.34%), terpinen-4-ol (10.82%), α-selinene (10.78%), β-caryophyllene (8.77%), β-selinene (7.75%), α-terpineol (7.70%), α-pinene (7.25%), cymene (6.94%), eudesmol (6.27%), β-cuvebene (6.10%), β-pinene (6.04%) and α-humulene (5.78 %). The essential oils of Picralima nitida seed may possibly find applications in therapy as an anticancer agent and antifungal based on the earlier studies on some of the compounds present in the essential oil. However, the oil should be scientifically evaluated in order to maximize its medicinal value.

Key words: *Picralima nitida*, essential oil, antifungal properties, GC-MS.

INTRODUCTION

Picralima nitida is a shrub plant that is widely distributed in tropical Africa including Nigeria. It belongs to the Apocynaceae family. In folk medicine, the root of *P. nitida* is traditionally used to relieve fever, malaria and pneumonia while the seeds are used in the treatment of stomach ache [1]. The leaf has been reported to have anti-tussive and antidiabetic properties. Studies have also shown the potential antioxidant, anti-inflammatory and hypoglycemic activities of *Picralima nitida* [2,3,4] The hypotensive effect of the aqueous extract of the seed has also been described[5]. Both the aqueous and ethanolic of *P. nitida* leaf extracts have been reported to contain alkaloids, cardiac glycosides, saponins and terpenes along with strong larvicidal and antifungal properties[6]. Seven compounds predominantly made up of alpha-methyl furanoside (70.61%) from the ethanolic extracts of the *P. nitida* fruit have been identified by Gas-Chromatography-Mass Spectrometry (GC-MS)[7]. The ethanolic leaf extracts also indicated the preponderance of 1,2,3,5-cyclohexanetetrol (40.73%) and alpha-methyl furanoside (39.88%) out of the total ten compounds identified[8]. To the best of our knowledge, the chemical constituents of the essential oil of *Picralima nitida* seeds have not been reported. This study was therefore undertaken to investigate the chemical composition of the essential oil of *Picralima nitida* seeds. This is expected to provide us with more insight into its medicinal usefulness.

MATERIALS AND METHODS

2.1. Essential oil and GC–MS analysis

Essential oils were extracted from chopped fresh seeds of *Picralima nitida* by hydro-distillation on a Clevenger apparatus. Small amount of hexane was added to aid the trapping of the oil during the process. The essential oil was collected and stored at 4^{o}C.

GC–MS analysis of the essential oil was performed using a GC HP 6890 powered with HP ChemStation Rev. A 09.01 [1206] software and fitted with a HP-5MS fused silica column (30 m · x 0.25 mm i.d., 0.25 µm film thickness). Inert hydrogen gas was used as a carrier gas at a constant flow rate of 1.0 ml/min. The mass spectrometer was operated in electron impact mode (70 eV). The following temperature program was used for essential oil analysis: initial temperature was 40 ^{o}C and heated to 200 ^{o}C at 5 ^{o}C/min, then to 220 ^{o}C for 2 min. The hydrogen pressure and compressed air were set at 22 psi and 28 psi respectively. The relative percentage of the essential oil constituents was expressed as percentage by peak area normalization. The individual constituents of the oil were identified on the basis of their retention indices with reference to a homologous series of *n*-alkenes and by comparison of their mass spectral fragmentation patterns (NIST 08.L database/chemstation data system) with data previously reported in literature.

RESULTS AND DISCUSSION

The results of the chemical composition of the essential oil of *Picralima nitida* seeds are listed in Table 1. A total of forty-three compounds were identified. The main constituents of the oils were sabinene (12.34%), terpinen-4-ol (10.82%), α-selinene (10.78%), β-caryophyllene (8.77%), β-selinene (7.75%), α-terpineol (7.70%), α-pinene (7.25%), cymene (6.94%), eudesmol (6.27%), β-cuvebene (6.10%), β-pinene (6.04%) and α-humulene (5.78 %), indicating the predominance of monoterpenes and sesquiterpene in the oils.

The inhibitory potential and the antimicrobial activity of essential oils have been suggested to depend on the major constituents and their concentrations with possible contributions from minor components[9]. Sabinene was the most abundant compound in the essential oil obtained from *Picralima nitida* seeds in this present study (Table 1). α-pinene was also present as one of the main components of the oils. The isolated fractions of *Juniperus communis L.* with high content of α-pinene and a mixture of α-pinene and sabinene have been reported to show a very strong antimicrobial activity, especially against fungi with much more extensive spectra of antimicrobial activity, as well as wider zones of inhibition than the commercial antibiotics[10]. Terpinen-4-ol, was reported as the most abundant component of the essential oil of *Melaleuca alternifolia* (tea tree oil) and presently the second most dominant compound in the essential oil of *Picralima nitida* seeds. This compound has been observed to suppress the inflammatory mediator production by activating the human monocytes[11]. Its anticancer potential has also been reported[12]. Selinene (α-selinene and β-selinene) was also obtained has one of the main constituents of *Picralima nitida* seed (Table 1). This compound has been reported to possess more antifungal properties than antibacterial [13, 14].

CONCLUSION

The results of this study showed that the essential oils of *Picralima nitida* seeds were predominated by monoterpenes and sesquiterpenes and with high possibility of finding applications in therapy as an anticancer agent and antifungal. However, the oil should be scientifically evaluated so as to maximize its medicinal value. This data provides information on the essential oil constituents of *Picralima nitida* seeds obtained in Nigeria, which until now has not been reported.

Table 1: Chemical composition of essential oils of *picralima nitida* seed

S/N	Retention time (min)	Chemical composition	T.P (%)
1	6.347	Cymene	6.93652
2	6.795	α-hellandrene	0.000041
3	7.269	α-terpinene	0.000331
4	7.656	Trans-β-ocimene	0.000041
5	8.1	Camphene	0.000029
6	8.308	Terpinolene	0.000041
7	9.37	Limonene	0.000043
8	9.698	α-pinene	7.246753
9	10.799	Benzyl alcohol	0.00009
10	11.377	β-pinene	6.035834
11	12.261	Cisocimene	0.784516
12	12.453	Sabinene	12.34478
13	12.777	Myrcene	0.000026
14	13.201	Allo ocimene	0.000313
15	13.836	Pinene-2-ol	0.04122
16	14.517	α-thujene	0.000169
17	14.886	Gama terpinene	0.001681
18	15.4	Geranial (neral)	0.000385
19	16.552	Linalool	0.000099
20	17.21	Borneol	0.000083
21	17.78	β-caryophyllene	8.765816
22	17.853	Citronellal	0.001292
23	18.026	1,8-cineole	2.629633
24	18.549	Nerol	0.000034
25	18.691	α-terpineol	7.701703
26	18.788	Terpinen-4-ol	10.82492
27	19.266	Citronellol	0.00137
28	19.608	Eugenol	0.001205
29	20.09	Ascaridole	0.000018
30	20.534	Linalyl acetate	0.000075
31	21.103	α-trepinenyl acetate	0.000116
32	21.419	Ethyl cinnamate	0.000097
33	21.623	Borneol acetate	0.000124
34	21.724	Neryl acetate	0.000587
36	22.091	Germacrene b	0.000143
37	24.038	[6]-shogaol	0.000043
38	24.727	α-copane	0.000071
39	27.775	Humulene (α-caryophylene)	5.784863
40	28.318	α-selinene	10.77749
41	28.511	β-selinene	7.750998
42	29.454	Eudesmol	6.267697
43	30.01	β-cuvebene	6.098707
		Total	100

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