

Hydrodistilled volatile constituents obtained from the roots of *Operculina turpethum*

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Shir, *Operculina turpethum* (basionym: *Convolvulus turpethum* L.; homotypic synonym: *Ipomoea turpethum* L., *Merremia turpethum* L.) is a perennial climber from Convolvulaceae. The plant roots, which are called Turbad in Persian folk medicine, are a strong purgative and have also been used for phlegmatic disorders, burns, fevers, jaundice, cough, uterine problems, joints and muscles pain, paralysis and sciatica.^[1] The plant has a wide range of applications in Ayurvedic formulations. Extracts of Turbad exhibited antioxidant, antihyperglycemic, antiulcer, anti-inflammatory, antimicrobial, cytotoxic, immunodulatory and anti-edema activities.^[2]

Several secondary metabolites including, glycoside resin, alkaloids, steroids and saponins have been isolated from the plant.^[3,4] The aim of this study was to investigate the volatile constituents of Turbad.

Roots of *O. turpethum* were purchased from Shiraz herbal market and authenticated by Miss Sedigheh Khademyan (taxonomist) and the voucher specimen was preserved with the code PM-160 in the Department of Pharmacognosy, Shiraz School of Pharmacy. The essential oil was extracted for 3 hours by hydrodistillation clevenger-type apparatus. The GC/MS analyses were carried out using a Hewlett-Packard 6890. The gas chromatograph was equipped with a HP-5MS capillary column (phenylmethylsiloxane, 25m' 0.25mm i.d.). The oven temperature was programmed from 60°C (4 min) to 250°C at a rate of 3°C/min and increased at a rate of 5°C/min to 280 and held for 10min. The carrier gas was helium with a flow

rate of 1.2 ml/min. The mass spectrometer was operating in the EI mode at 70 eV. The interface temperature was 250°C; mass range was 30–600 *m/z*. The Kovats index (KI) of components was calculated using a homologous series of n-alkanes under the same operational conditions of analysis. Identification of components was based on a comparison of their KI and mass spectra with Wiley (275), Adams libraries spectra and Pherobase Kovats Index Database.^[5]

The volatile constituents of Turbad were trapped in hexane and gave a colorless solution with characteristic odor. Nineteen compounds were identified which represented about 92% of the total detected constituents. The identified compounds, their percentage and Kovats index are summarized in table 1.

Carvacrol (37%), caryophyllene oxide (14.7%), and thymol (11.3%) were the major components. The main class of the compounds was found to be oxygen containing monoterpenes (65.17%), sesquiterpene hydrocarbons (19.83%) and monoterpene hydrocarbons (0.15%). Oxygen containing sesquiterpenes were not identified.

The authors of this study could not find any reports on essential oil components of the *O. turpethum* but Wang and Kays^[6] evaluated the volatile constituents of *Ipomoea batatas* (another species of this genus) and reported linalool, palmitic acid, and beta caryophyllene as aromatic constituents of the plants root although the amount of these components were different from the results of this study. The presence of linalool, α - and β -caryophyllene, β - and γ -elemene, and β -cubebene in *Ipomoea batatas* tips during its fermentation was reported by Cue et al.^[7] In another report, p-cymene and carvone have been reported as the major constituents of *Ipomoea cairica* (another species of this genus) volatile oil which have larvicidal and repellent activity against malarial fever mosquitoes.^[8]

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Table 1. Volatile constituents of *O. turpethum*.

Compound	KI	Percentage
1 n-Decane	1000	0.16
2 <i>p</i> -Cymene	1024	0.15
3 1,8-Cineole	1032	0.54
4 Fenchone	1088	0.12
5 Linalool oxide trans	1088	0.24
6 n-Undecane	1099	0.20
7 Linalool	1104	5.96
8 Bornyl acetate	1285	0.41
9 Anethole	1291	8.15
10 1-Methoxy-4-(1-propenyl)-benzene	1299	1.66
11 Thymol	1312	11.30
12 Carvacrol	1322	36.95
13 Unknown	1352	2.19
14 Carvacrol acetate	1375	1.50
15 β -Caryophyllene	1414	3.54
16 Aromadendrene	1434	0.57
17 α -Humulene	1449	0.46
18 Ledene	1490	0.55
19 Caryophyllene oxide	1579	14.71
20 Unknown	1660	1.57
21 Palmitic acid	2056	4.81
22 Unknown	2225	1.97

Antimicrobial activity of carvacrol, caryophyllene, thymol and linalool, the major volatile components of the root in this analysis, has been reported several times.^[9] These volatile components exhibited some other biological activities including anti inflammatory, anti spasmodic, analgesic, anti oxidant and insect repellent properties.^[10]

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