

Research Article

The Phytochemical Constituents of *Withania somnifera* and *Withania obtusifolia* by GCMS Analysis

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ABSTRACT

The present study was comparative of phytochemical analysis in *Withania somnifera* and *Withania obtusifolia*. The *Withania* root powder extract with absolute alcohol, the phytochemical compound screened by qualitative and GC-MS method. In the GC-MS analysis, 24 bioactive phytechemical compounds were identified in *W.obtusifolia*, but in the case *W.somnifera* 21 bioactive compounds were detected. These two *Withania* species having morphology and anatomically slightly differ but the phytochemical are different in these two species.

Key words: Phytochemical, *Withania somnifera*, *Withania obtusifolia*, Solanaceae.

INTRODUCTION

W.somnifera is commonly known Aswagandha, It is in Indian Ginseng and it is member of Solanaceae. In *Withania* genus there are three species are found in India namely, *W.somnifera*, *W.coagulans* and *W.obtusifolia* it is distributed in tropical and subtropical region like Rajasthan, Madhya Pradesh, Punjab, Himachal Pradesh, Jammu and Kashmir, Western Himalayas and Tamil Nadu, in Tamil Nadu it is distributed in Trichy, Perambalur, Thanjavur, Ariyalur, Lalgudi and Kadalur. *Withania* plants is used anticancer properties, anti

inflammatory, fertility, food for cattle, it make chutney¹. Earlier taxonomist recorded a single species (tetraploid), *W. somnifera* from the wild. Extensive field survey and critical perusal of literature revealed the presence of additional diploid species of *W. obtusifolia* in the natural population². The application of morphological and anatomical study has proven to be immense assistance in interpreting problems related to identification of differences between the two species^{3&4}. The present research work is aimed to describe the phytochemical variations between the two *Withania* species

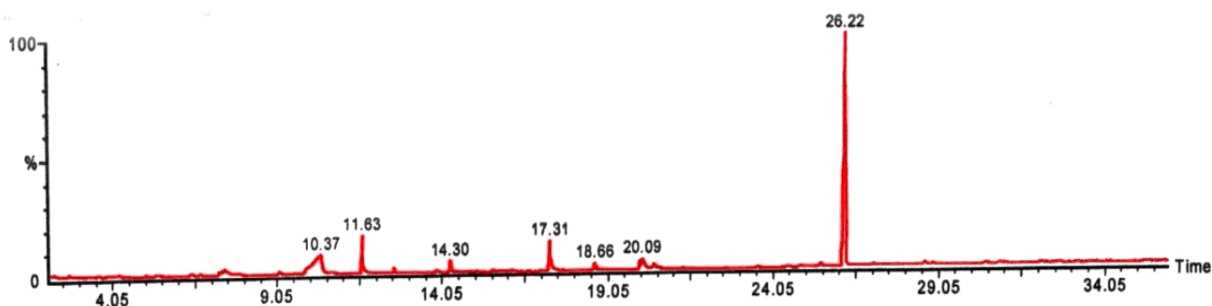


Fig 1. The chromatogram structure of *Withania obtusifolia*

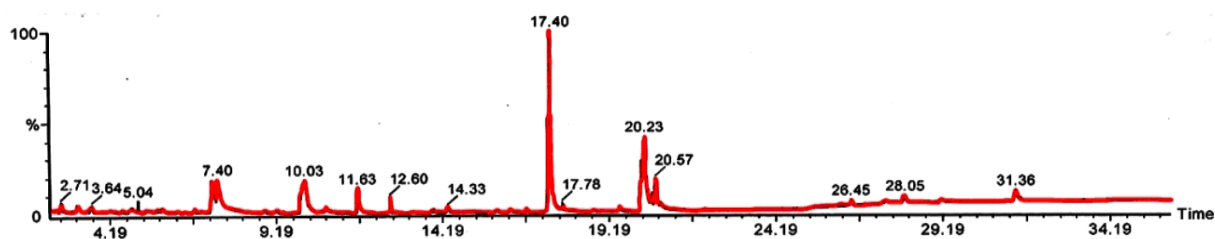


Fig 2. The chromatogram structure of *Withania somnifera*

Table 1: To identified Detectable and Non detectable compound in *Withania obtusifolia* (Tackh) and *Withania somnifera* L. (Dunal) – using GCMS

S.No	Phytochemical compound	<i>W. obtusifolia</i>	<i>W. somnifera</i>
		Detectable compound	Non-detectable compound
1	Sugar compound	+	+
2	Hydrocarbon	+	+
3	Ether compound	+	+
4	Nitrogen compound	+	+
5	Fatty Acid	+	+
6	Fatty Acid ester	+	+
7	Alcoholic compound	+	+
8	Lauric Acid	+	+
9	Alkaloid	+	+
10	Oxirane compound	+	-
11	Iodine compound	+	-
12	Phenolic compound	+	-
13	Myristic acid	+	+
14	Plasticizer compound	+	-
15	Palmitic Acid	+	-
16	Ketone compound	+	+
17	Alkene compound	+	+
18	Oleic acid	+	+
19	Aldehyde	-	+

+: Detected compound

- : Non-detected compound

MATERIALS AND METHODS**GC-MS Analysis**

The GC-MS analysis of the two *Withania* plants root extract with in absolute alcohol, was performed using a Clarus 500 Perkin Elmer gas chromatography equipped with a Elite-5 capillary coloum (5% Diphenyl 95% dimethyl poly siloxane) (30nm X 0.25mm ID X 0.25µm) and mass detector turbomass gold of the company which was operated in EI mode. Helium was the carriers gas at a flow rate of 1 ml/min. the injector was operated at 200°C and the oven temperature was programmed as follows; 60°C for 15min, then gradually increased to 270°C at 3 min. the identification of components was based on comparison of their mass spectra with those of Wiley and NIST Libraries and those described by Adams⁴ as well as on comparison of their retention indices Vanden⁵ with literature.

RESULTS AND DISCUSSION

The present study carried out on The *Withania* root powder extract with absolute alcohol, the phytochemical compound screened by qualitative and GC-MS method. In the GC-MS analysis, 24 bioactive phytechemical compounds were identified in the same extract of *W.obtusifolia*, but in case *W.somnifera* 21 bioactive compound were detected. The phytochemcial active compounds of *Withania* were qualitatively analyzed and the results are presented in (Table-1). In analysis of Alkaloid, Nitrogen compound, Sugar compound, Hydrocarbon compounds and other compound are detectable in the *Withania* plant species. But in some compound namely Oxirane compound, Iodine compound, Phenolic compound Plasticizer compound, Palmitic Acid are detect only for *W.obtusifolia* but in case of *W.somnifera*

Table 2. Comparative of phytochemical compounds identified of *Withania obtusifolia* (Tackh) and *Withania somnifera* L. (Dunal) using GC-MS

S. N .	<i>Withania obtusifolia</i>					<i>Withania somnifera</i>				
	Name of the compound	RT	Mol. formula	M W	Peak Area	Name of the compound	RT	Mol. formula	M W	Peak Area
1	D. Galactose	2.73	C ₆ H ₁₂ O ₆	180	0.28	Propane, 1,1-diethoxy-2-methyl-	2.71	C ₈ H ₁₈ O ₂	146	0.36
2	Cyclopentane, 1-methyl-3-(2-methylpropyl)-	4.24	C ₁₀ H ₂₀	140	0.54	2,3,4,5-Tetrahydropyridazine	3.18	C ₄ H ₈ N ₂	84	11.07
3	Propane, 1,1,3-triethoxy	5.05	C ₉ H ₂₀ O ₃	176	0.19	Butane, 1,1-diethoxy-2-methyl-	3.64	C ₉ H ₂₀ O ₂	160	11.60
4	Octanoic Acid	6.42	C ₈ H ₁₆ O ₂	144	0.61	2-Nonanone	4.85	C ₉ H ₁₈ O	142	0.84
5	8-Azabicyclo[3.2.1]octan-3-ol,8-methyl-endo	7.44	C ₈ H ₁₅ NO	141	4.06	Propane, 1,1,3-triethoxy	5.04	C ₉ H ₂₀ O ₃	176	1.45
6	Undecanoic acid	9.11	C ₁₁ H ₂₂ O ₂	186	0.65	PhenylethylAlcohol	5.74	C ₈ H ₁₀ O	122	1.30
7	1,3-Propanediol, 2-ethyl-2-(hydroxymethyl)	10.37	C ₆ H ₁₄ O ₃	134	19.7	3-Hexenoic acid, butyl ester, (Z)	6.71	C ₁₀ H ₁₈ O ₂	170	0.97
8	3-Hexenoic acid, butyl ester, (Z)	10.64	C ₁₀ H ₁₈ O ₂	170	1.14	8-zabicyclo[3.2.1]octan-3-ol,8-methyl-endo	7.40	C ₈ H ₁₅ NO	141	0.78
9	Dodecanoic acid	11.63	C ₁₂ H ₂₄ O ₂	200	5.64	Sucrose	10.03	C ₁₂ H ₂₂ O ₁₁	342	0.47
10	1H-Indole, 2-pyrrolidin-2-yl	12.58	C ₁₂ H ₁₄ N ₂	186	0.59	Amyl Nitrite	10.68	C ₅ H ₁₁ NO ₂	117	23.64
11	Oxirane, [(tetracyloxy)methyl]	12.89	C ₁₇ H ₃₄ O ₂	270	0.11	Dodecanoic acid	11.63	C ₁₂ H ₂₄ O ₂	200	0.55
12	6β Bicyclo[4.3.0]nonane, 5β-iodomethyl-1β-isopropenyl-4α,5α-dimethyl-,	13.88	C ₁₅ H ₂₅	332	0.35	3-tert-Butyl-4-hydroxyanisole	11.68	C ₁₁ H ₁₆ O ₂	180	4.42
13	Phenol, 4-(1-phenylethyl)-	13.93	C ₁₄ H ₁₄ O	198	0.12	1H-Indole, 2-pyrrolidin-2-yl-	12.60	C ₁₂ H ₁₄ N ₂	186	12.32
14	Tetradecanoic acid	14.30	C ₁₄ H ₂₈ O ₂	228	1.81	Tetradecanoic acid	14.33	C ₁₄ H ₂₈ O ₂	228	0.81
15	Didodecylphthalate	15.75	C ₃₂ H ₅₄ O ₄	502	0.1	Decanoic acid, 2-methyl	16.70	C ₁₁ H ₂₂ O ₂	186	2.81
16	1H-Cyclopenta(b)quinoline, 2,3-dihydro-9-amino-	16.15	C ₁₂ H ₁₂ N ₂	184	0.14	n-Hexadecanoic acid	17.40	C ₁₆ H ₃₂ O ₂	256	0.36
17	n-Hexadecanoic acid	17.31	C ₁₆ H ₃₂ O ₂	256	6.89	Decanoic acid, ethyl ester	17.78	C ₁₂ H ₂₄ O ₂	200	11.07
18	Pentadecanoic acid, 2,6,10,14-tetramethyl-methyl ester	17.70	C ₂₀ H ₄₀ O ₂	312	0.56	1,E-11,Z-13-Octadecatriene	20.13	C ₁₈ H ₃₂	248	11.60

1	7,11-Epoxy-9-methyl-5(6)-en-9-one	18.66	$C_{13}H_{20}O_2$	208	1.08	9-Octadecenal	20.23	$C_{18}H_{34}O$	266	0.84
2	1,E-11,Z-13-Octadecatriene	20.00	$C_{18}H_{32}$	248	1.29	1-Tridecyne	20.45	$C_{13}H_{24}$	180	1.45
2	9,12-11-Decadienoic acid (Z,Z)-	20.09	$C_{18}H_{32}O_2$	280	3.78	Oleic acid	20.57	$C_{18}H_{34}O_2$	282	1.30
2	Oleic acid	20.43	$C_{18}H_{34}O_2$	282	0.88	-	-	-	-	-
2	Phenol, 2,4-bis(1-Phenylethyl)-	25.50	$C_{22}H_{22}O$	302	0.66	-	-	-	-	-
2	1,2-Benzenedicarboxylic acid, diisooctyl ester	26.22	$C_{24}H_{38}O_4$	390	48.56	-	-	-	-	-

was not detected, similarly based on the detectable and non detectable compounds of these *Withania* plants. In *Aloe vera* species there are 26 bioactive compounds are detected. J. Sitosterol ($C_{29}H_{50}O$) with RT 38.78 has peak area 13.19% Olic Acid ($C_{18}H_{34}O_2$) with RT (21.85) and 9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z). ($C_{19}H_{33}O_2$) with RT 22.06 ranks next having peak area 11.74% and 11.36% respectively. Phytol ($C_{20}H_{40}O$) with RT 21.07 ranks with peak area 10.01%⁷.

In our result In the GC-MS analysis, 24, 21 bioactive phytochemical compounds were identified in the absolute alcohol extract of namely *W.obtusifolia* and *W.somnifera*. The identification of phytochemical compounds is based on the peak area, molecular weight and molecular formula in some compound namely, D.Galactose ($C_6H_{12}O_6$) with RT 2.73 has peak area 0.28, Phenol, 4-(1-phenylethyl)- ($C_{14}H_{28}O$) with RT (13.93) 0.12 peak area and 1,2-Benzenedicarboxylic acid, diisooctyl ester, ($C_{24}H_{38}O_4$) with RT 26.22 Peak area 48.56 in *W.obtusifolia* plant but in case of *W.somnifera* the identification of phytochemical compounds is based on the peak area, molecular weight and molecular formula. Propane, 1,1-diethoxy-2-methyl- ($C_8H_{18}O_2$) with RT 2.71 and Peak area 0.36, 8-azabicyclo[3.2.1]octan-3-ol,8-methyl-endo, ($C_8H_{15}NO$) with RT 7.40 and the peak area 0.78 and Oleic acid ($C_{18}H_{34}O_2$) with RT 20.57 and Peak area 1.30 the results are presented in (Table-2) and chromatogram (Fig 1 and 2)

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