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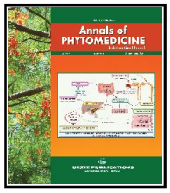

Original Article : Open Access

GC-MS profiling and phytopharmacological analysis of aqueous distillate of *Cyperus scariosus* R.Br.

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Abstract

Aqueous distillate of *Cyperus scariosus* R.Br. investigated for phytochemical constituents by GC-MS technique. Both qualitative and quantitative analysis were performed by a high-performance quadrupole mass filter. Aqueous distillate of *C. scariosus* roots stated more than one hundred phytochemical compounds, including terpenoids, flavonoids, sterols, steroids, glycosides, and alkaloids in the GC-MS analysis. The constituents were identified through contrasting their mass spectra fragmentation patterns and correlation indices with that stockpile on the MS-Computer library along with information from published literatures. Trans-carveol, di-isononyl phthalate, alpha and beta selinene, octadecanoic acid, limonene, 2, 5-piperazinedione, 3, 6-bis (phenylmethyl)-, sesquiterpenoid were the main constituents in the aqueous distillate of *C. scariosus* roots. The presence of these compounds relates to the use of herbal roots by traditional healers. Taking into account that the core substances essential for the antioxidant, antibacterial, anti-inflammatory, and afflictions of numerous diseases are terpenoids and sterols. Since the principal components of the aqueous distillate of *C. scariosus* roots were terpenoids and sterols, this extract may find usage in a variety of ailments.

1. Introduction

One of the first known uses of medicine in human history has been the use of herbal remedies to treat a variety of illnesses. Herbal medicine has been used to treat a wide range of illnesses since the BC era (Archana *et al*., 2022). Even with all of the current medication advancements, Ayurvedic treatments are still chosen for a variety of eye conditions, including central serous retinopathy (Shanti *et al*., 2023).The ability of traditional herbal medicines-more specifically, polyherbal herbal medicine formulations to surpass the drawbacks of current medications are drawing interest (Shreya *et al.,* 2024). Various innovative delivery systems, including as liposomes, niosomes, and phytosomes, can increase the bioavailability by improving both the release rate and the capacity to pass lipoidal membranes (Awaneet *et al.,* 2023). Hence, combined with additional compounds, herbal extracts can improve the stability, penetration, and duration of contact while treating eye disorders (Basile *et al*., 2023). As a result, the usage of medicinal plants is becoming more common than it was before especially in chronic ailments (Chaudhary *et al.,* 2023).

Notably the Charak Samhita, Sushruta Samhita, Ras Tantra Sar, Ras Tarang, Bhavprakasha, Nayan Drastam, and Astanghriday Vedic Indian texts support this. Before 500 BC, Sushruta, the father of surgery in India, determined that many kinds of plants could be applied to cure a wide range of illnesses. They are utilised in compound formulations alone or alongside with other plants as juice, arka, extract, kwatha, paka, and other forms (Shastri *et al*., 2009). Because herbal medicinal plants possess bioactive substances, there are no adverse consequences. Medicinal plants serve as crucial to sustaining the health of both individuals and societies as a whole (Singh *et al.,* 2011).The formulation of the herbal eye drop is designed to help with inflammatory and allergies of the eyes. Comparatively costly synthetic medications, which sometimes have negative consequences and are out of the reach of underprivileged patients, they are more accessible, dependable, and have ineffective side effects. Modern science is only now beginning to understand the effectiveness of many ancient herbal remedies in treating eye conditions (Shastri *et al*., 2009; Zubair *et al*., 2023). Certain chemical compounds found in plants have a specific physiological effect on humans, which accounts for their medical worth. Among these plant bioactive components, alkaloids, terpenoids, flavonoids, and phenolic compounds are the most significant (Bhardwaj *et al.,* 2011).

In Ayurveda, Indian system of medicine, several disorders and diseases have been described in extensive details. The World Health Organization (WHO) substantiates the use of traditional medicine, they are proven and validated to be efficacious and safe (Ahmed *et al.,* 2011). Numerous indigenous medicinal plants are used as spices and food. Additionally, they are also sometimes added to foods meant for pregnant women and nursing mothers for medicinal purposes. Likewise, the benefits of herbal medicine for the treatment of diseases and infections are as old as humankind (Ahmed *et al.,* 2011).

A member of the Cyperaceae family, *C. scariosus* can be referred to as “Nut grass” in English and Nagarmotha in Hindi. Shattery grass

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*C. scariosus*can be observed in several locations in Bangladesh as well as in the eastern and southern regions of the Indo-Pak peninsula. The genus Cyperus is widely distributed around the world and includes more than 700 species, out of which only 60 are available in India. A considerable number of plants are used as fodder; many produce culms and leaves, and finally some produce tuberous rhizomes that are useful for food, medicine, and perfumes (Ahmed *et al*., 2011). Folklore indicates that plant roots can emmenagogue, vermifuge, desiccant, tonic, and cordial (Biswas *et al.,* 2011).

It is believed to be a vital component of many drugs used in a conventional healthcare system. It can treat a variety of illnesses, such as fever, diarrhoea, epilepsy, syphilis, and liver damage (Kyselova *et al.,* 2004). The essential oil procured on steam distillation of rhizomes and roots of the plant having usefulness in perfumery (Anonymous *et al.,* 2000)and is also attributed to antibacterial (Anonymous *et al*., 2001), antifungal (Pasupathi *et al.,* 2010) also as plant growth-regulating effects (Vijayendra *et al.,* 2005), analgesic and antidiabetic activity (Sankar *et al*., 2006), hepatoprotective activity (Vijayendra *et al*., 2005), hypotensive and spasmolytic activity (Baha *et al.,* 2014).This plant is known to have astringent, diuretic, antioxidant, antibacterial, anti-inflammatory, and central nervous system stimulating properties. Figure 1 shows the taxonomy of *C. scariosus*.The current investigation has attempted to study the watery distillate of *C. scariosus* roots, which contains numerous important phytochemical compounds that have been analyzed by GC-MS and have numerous pharmacological properties, in an effort to provide as much information as possible about the best way to use herbal plants in medicine (Sandeep *et al.,* 2010).

Figure 1: Taxonomy of *C. scariosus*.

2. Botanical description

Cyperus scariosus R.Br. is a small herb that mimics grass and has soft, angular stems that grow underground as rhizomatous tubers. The herb is glabrous. The thin, 0.8-5.0 cm by 0.25 cm stolon's have been wrapped in loose, acute, elliptic striate concolorous scales. stem 40-90 cm long, slender, triquetrous at top 1/24-1/16 inches in diameter; leaves variable, usually short (less than 1/3 stem), tapered, weak; umbels slender, contracted; bracts slender occasionally up to 3 inches long; spikes are linear, pale straw-colored; rhizome very short, woody, stolons, lateral shoots from base of stem immediately ascending; glumes scarcely imbricate in fruit (Russel *et al.,* 1984; Manish *et al.,* 2011).

3. Materials and Methods

3.1 Procurementand authentication of plant materials

Fresh plant of *C. scariosus* were collected from the local market of Aminabad, Lucknow, Uttar Pradesh, India. The plant with proper identification and details was sent to NISCAIR (Reference number NISCAIR/RHMD/Consult/2021/4131-32) *C. scariosus* was verified and validated by the CSIR-National Institute of Science Communication and Policy Research (NISCPR), Delhi.

3.2 Preparation of *C. scariosus* aqueous distillate

The plant materials were rinsed with tap water and allowed to air dry. The root was shade dried to avoid denaturation of constituents, by wrapping with paper for 15 days (Hayat *et al.,* 1986). The dried roots were pulverized to make coarse powder (Bhardwaj *et al.*, 2011). It was then soaked in 100 ml distilled water all over the night. This makes the medication pliable and facilitates the easy release of the volatile ingredients when it is boiled. The coarse powdered plant roots were cooked in pure water in a ratio of 1:16. Themixture was poured into the distilled assembly followed by condensed vapors collected in a receiver. The aqueous distillate so obtained was kept in an airtight container and used for GC-MS analysis to identify the various phytoconstituents including alkaloids, flavonoids, glycosides, phenols, saponins, tannins, anthraquinones, quinines, reducing sugars, cardiac glycosides, steroids, soluble starch,terpenoids, amino acids, and proteins test, *etc.* (Kanoujia *et al*., 2012; Kokate, 2006 and 2019; Sofowara, 1993; Trease and Evans, 2002; Harborne, 2012).

3.3 Standardization of aqueous distillate

3.3.1 Preliminary phytochemical screening of aqueous distillate

The phytochemicals were analyzed in the aqueous distillate by various tests (Subimol *et al.,* 2013).

3.3.2 Gas chromatography-mass spectrometry analysis

The aqueous distillate of *C. scariosus*was exposed to gas chromatography-mass spectrometry (GC-MS) analysis (Using SHIMADZU, GC-MSQP2010). It comprises a single quadrupole gas chromatograph-mass spectrometer which provides stable and economic analysis of complex chemicals. A high-performance quadrupole mass filter that is outfitted with two narrow-bore capillary columns (RT × 5 MS; cross-bond 5% diphenyl and 95% dimethylpolysiloxane) with a film thickness of 30 × 0.25 mm × 0.25 µ and split-less inject mode at 250°C using helium as a carrier gas proves high sensitivity in both quantitative and qualitative analysis.

The column flow was 1.11 ml/min in a mode with constant linear velocity. The temperature of the oven was kept at 150°C (hold for 1 min), and then continued at 10°C per min to 320°C (hold for 4 min). The MS was run in selected ion monitoring (SIM) mode using electron ionization at 70 eV over a 320°C transfer line. The test sample's components are evaporated in the GC equipment's injection section and detached in the column using the adsorption and desorption processes. The temperature of each component is programmed appropriately, and the software controls which components are eluted based on their respective boiling points (Srikanth *et al.,* 2007). The time at which each component eluted from the GC column is termed as retention time (RT). The GC runs for twenty-two min in total. The mass detector finds the eluted component. The name, area, area percentage, and structure of the test material's composition were known by the spectrum of the known components kept in the NIST library for GC-MS analysis (Deepak *et al.,* 2014). The process for finding the components involved comparing their mass spectra to those found in the Wiley and NIST libraries, as well as analyzing their retention indices with available data (Sriknath *et al.,* 200; Uratti *et al*., 1990).

4. Results

4.1 Phytochemical screening of aqueous distillate

The aqueous distillate underwent phytochemical screening, which revealed the presence of alkaloids, flavonoids, steroids, tannins, terpenoids, and glycosides. The results of this study are qualitatively examined. Table 1 shows the outcomes.

4.2 Gas chromatography-mass spectrometry analysis

Based on the compounds' peak area, height, and retention time, the water distillate of *C. scariosus* roots comprised more than one hundred phytochemical compounds as identified by GC-MS analysis as shown in Table 2.

Table 1: Phytochemical tests of *aqueous* distillate of *C. scariosus* root

S. No.	Phytochemicals	Test performed	Result (in triplicate)
1.	Alkaloid	Dragendorff's test, Mayer's test, Wagner's test	+ve
2.	Flavanoids	Alkaline test	+ve
3.	Steroid	Shinoda test	+ve
4.	Tannin	Neutral $FeCl_3$	-ve
5.	Terpenoid	Liebermann-Burchard reagent	+ve
6.	Glycoside	Molisch's test	+ve
7.	Glycoside	Noller's test	+ve
8.	Glycoside	NaOH solution	+ve
9.	Glycoside	Borntrager´s test	+ve
10.	Proteins	Biuret test	-ve
11.	Proteins	Million's test	-ve
12.	Amino acids	Ninhydrin test	-ve

Table 2: Phytochemical compounds recognized from aqueous distillate of *C. scariosus*by GC-MS

Peak	Retention time	Fraction time	Area	Area%	Height	Name
1.	8.983	9.015	841261	0.04	192581	Pentanoicacid,4-methyl-
2.	9.440	9.550	676168	0.03	170053	1-Propanol,3-(methylthio)-
3.	11.040	11.195	1274695	0.06	278806	Benzylalcohol
4.	11.342	11.505	2102716	0.10	424168	Benzylalcohol
5.	12.074	12.170	1286279	0.06	389360	1-Octanol
6.	12.216	12.335	737896	0.04	183933	1,1-Dimethyl-1-silacyclopentane
7.	12.406	12.540	2031333	0.10	690442	1-Octanol
8.	13.302	13.475	2534504	0.12	579814	Phenylethylalcohol
9.	13.685	13.880	4530325	0.22	1134350	Phenylethylalcohol
10.	15.879	15.935	3781015	0.18	583123	Hexanediamide,N,N'-di-benzoyloxy-
11.	16.070	16.115	5298017	0.26	1023925	Benzoicacid

12.	16.628	16.730	2991379	0.15	412942	2-Piperidinone
13.	17.720	17.740	838950	0.04	300510	7-Methyloctanoicacid
14.	17.899	17.935	8627171	0.42	1580796	Benzeneacetic acid
15.	18.898	18.930	138718013	6.79	6221349	Benzeneacetic acid
16.	18.962	19.040	2339167	0.11	825554	Indole
17.	19.969	20.080	3201514	0.16	714857	Hydrocinnamicacid
18.	20.688	20.800	32974687	1.61	3271146	Hydrocinnamicacid
19.	21.215	21.350	4907636	0.24	1056716	-
20.	21.400	21.450	1088149	0.05	421571	2-Propenoicacid,3-phenyl-
21.	21.489	21.550	745486	0.04	262010	Indole,3-methyl-
22.	22.071	22.300	2976135	0.15	451478	Benzeneacetamide
23.	22.460	22.595	1328543	0.06	267190	2-Propenoicacid,3-phenyl-
24.	22.945	23.110	11587451	0.57	1782590	Benzeneethanol,4-hydroxy-
25.	23.656	23.715	25146187	1.23	2046770	(Z)-3-Phenyl-2-propenoic acid
26.	24.238	24.305	1016535	0.05	286691	Limonene
27.	24.361	24.445	561602	0.03	165931	1-Dodecanol
28.	24.991	25.110	760191	0.04	106313	2H-Indol-2-one, 1,3-dihydro-
29.	25.421	25.525	2151199	0.11	497241	1H-Benzocycloheptene, 2,4a,5,6,7,8-hexahydr
30.	25.743	25.875	1780163	0.09	404496	2,4-Di-tert-butylphenol
31.	25.954	26.100	773715	0.04	139323	Acetamide,N-(2-phenylethyl)
32.	27.361	27.480	2237658	0.11	362127	-
33.	28.088	28.205	14106498	0.69	1933644	Dodecanoic acid
34.	28.946	28.990	610987	0.03	236955	t-Butylhydroquinone
35.	29.537	29.655	1687404	0.08	518690	Tridecanoic acid
36.	30.042	30.105	652294	0.03	226287	1H-Benzocyclohepten-7-ol,2,3,4,4a,5,6,7, 8-o
37.	30.272	30.375	881113	0.04	253596	Tridecanoic acid
38.	30.495	30.600	1259430	0.06	353514	Chloroaceticacid,dodecyl ester
39.	30.964	31.065	3722788	0.18	732623	Benzo[h]quinoline,2,4-dimethyl-
40.	31.339	31.555	18064314	0.88	2464276	3-Methyl-2,3,6,7,8,8a-hexahydropyrrolo [1,2-a
41.	31.634	31.660	842487	0.04	383126	Tetradecanoic acid
42.	31.779	31.925	8995276	0.44	1575322	Palmitoleicacid
43.	32.174	32.235	61689156	3.02	11338673	Tetradecanoic acid
44.	32.281	32.305	960678	0.05	550223	Pyrrolo[1,2-a] pyrazine-1,4-dione,hexahydro-
45.	32.404	32.460	2443487	0.12	726920	-
46.	32.574	32.655	4237519	0.21	809504	Pyrrolo[1,2-a] pyrazine-1,4-dione,hexahydro-
47.	33.099	33.150	148096973	7.24	17588284	Cyclo(L-prolyl-L-valine)
48.	33.181	33.230	2542628	0.12	1369902	i-Propyl 12-methyltetradecanoate
49.	33.292	33.315	1009001	0.05	536286	3-Isobutyl-2,5-piperazinedione
50.	33.415	33.440	5362028	0.26	1724675	Cyclo(L-prolyl-L-valine)
51.	33.451	33.465	726320	0.04	553899	-
52.	33.528	33.555	5433437	0.27	2130831	Pentadecanoicacid
53.	33.574	33.600	815033	0.04	666385	Cyclo(L-prolyl-L-valine)

54.	33.678	33.720	560560	0.03	315994	N-Pentadecylacetamide
55.	33.812	33.865	5940158	0.29	1651842	Acetamide, N, N-dibutyl-2-chloro-
56.	33.938	33.965	1683407	0.08	890090	7,9-Di-tert-butyl-1-oxaspiro (4,5) deca-6,9-dien
57.	34.183	34.215	37448626	1.83	4818258	3,6-Diisopropylpiperazin-2,5-dione
58.	34.445	34.480	8485992	0.42	2680174	Octahydrodipyrrolo[1,2-a:1',2'-d] pyrazine-5,1
59.	34.820	34.890	210907837	10.32	30895734	-
60.	34.947	34.960	21376939	1.05	8060027	2-Tridecenoicacid, (E)-
61.	35.116	35.240	256545734	12.55	34089264	-
62.	35.408	35.435	2876033	0.14	1684430	(+)-beta-Selinene
63.	35.484	35.550	11152167	0.55	5377944	6,7,8,9-Tetrahydro-5H- [1,2,4] triazolo[1,5-a] a
64.	35.666	35.700	2125695	0.10	1023795	Cyclohexane, 2-butyl-1,1,3-trimethyl-
65.	35.744	35.795	4348975	0.21	2028467	l-(+)-Ascorbicacid2,6-dihexadecanoate
66.	36.115	36.220	24270033	1.19	6262059	9-Octadecenoicacid, (E)-
67.	36.258	36.295	952776	0.05	503106	l-(+)-Ascorbicacid2,6-dihexadecanoate
68.	37.758	37.955	61421425	3.00	7832092	9-Octadecenoicacid, (E)-
69.	38.029	38.120	3878934	0.19	1220474	Octadecanoicacid
70.	38.499	38.540	2074418	0.10	583974	-
71.	39.075	39.090	17618243	0.86	2131230	-
72.	39.238	39.320	34899049	1.71	3717356	(-)-alpha-Selinene
73.	39.409	39.470	13420797	0.66	3614326	7-epi-alpha-Selinene
74.	39.515	39.580	7617943	0.37	2026203	-
75.	39.699	39.755	2743805	0.13	595296	Hexahydro-3-(1-methylpropyl) pyrrolo[1,2-a] p
76.	40.005	40.100	1092585	0.05	269764	8H- [1,2,5] Thiadiazolo[3,4-e] [1,4] diazepin-8-
77.	40.462	40.570	22138192	1.08	2823175	2,5-Piperazinedione,3-benzyl-6-isopropyl-
78.	40.613	40.685	511930	0.03	184963	Tetradecanoicacid,2-hydroxy-1- (hydroxy met
79.	41.469	41.520	164680664	8.06	14403344	Phe-Leu-OH
80.	41.621	41.645	17561462	0.86	4814378	-
81.	41.898	41.930	243845445	11.93	26699930	(-)-trans-carveol
82.	41.948	41.985	5345485	0.26	3978983	3-Hydroxy-7-methoxy-3-phenyl-4-chromanon
83.	42.150	42.200	669064	0.03	240550	RT:42.150
84.	42.509	42.560	954159	0.05	415851	Tetracosamethyl-cyclododecasiloxane
85.	42.740	42.800	3290635	0.16	1192014	9-Octadecenoicacid (Z)-,2,3-dihydroxypropy
86.	42.830	42.865	554073	0.03	302395	3-Benzylidene-hexahydro-pyrrolo[1,2-a]pyraz
87.	42.915	43.015	22219406	1.09	8664424	Hexadecanoicacid, 2-hydroxy-1- (hydroxy met
88.	43.059	43.150	14273175	0.70	8507001	Bis(2-ethylhexyl) phthalate
89.	43.487	43.565	1037622	0.05	424069	4-[1-Methyl-1-(4-methylphenyl) ethyl] benzoic
90.	43.804	43.945	30893098	1.51	4691726	Phe-Leu-OH
91.	44.243	44.315	40748693	1.99	7868106	Phe-Leu-OH
92.	44.850	44.885	8785993	0.43	3060158	Octadecanoicacid, 2,3-dihydroxypropylester
93.	44.965	44.980	10587051	0.52	2050167	-
94.	45.115	45.175	29947034	1.46	4092300	Cyclo(prolyltyrosyl)
95.	45.205	45.235	948420	0.05	554628	Di-2,6-dimethyl-4-heptylphthalate

96.	45.535	45.630	92176502	4.51	16946181	13-Docosenamide,(Z)-
97.	45.860	45.925	6380282	0.31	2184971	Di-isononyl phthalate
98.	45.992	46.045	10861814	0.53	3120532	2,5-Piperazinedione,3,6-bis(phenylmethyl)-
99.	46.191	46.265	4013369	0.20	1415980	Di-isononyl phthalate
100.	46.303	46.395	2195810	0.11	662461	Di-isononyl phthalate
101.	46.543	46.610	3936735	0.19	1353404	Di-isononyl phthalate
102.	46.672	46.725	1028088	0.05	345823	Di-isononyl phthalate
103.	46.913	46.965	1774787	0.09	668426	Di-isononyl phthalate
104.	48.335	48.495	1199724	0.06	200354	Benzoic acid, 4-amino-,2,2,6,6-tetramethyl-1-
105.	48.952	49.215	12443228	0.61	905428	Urs-12-en-23-oicacid,3-(acetyloxy)-,(4. beta.

The most common compounds found in the aqueous distillate of *C. scariosus* roots were trans-carveol, that has a retention time (RT) of 41.898; hexadecanoic acid, retention time of 42.915; alpha and beta selinene, retention time of 39.238; octadecanoic acid, retention time of 38.029; benzoic acid, 4-amino-, 2,2,6,6-tetramethyl-1-, 2, 5-piperazinedione, and 3, 6-bis (phenylmethyl)-, all of which have a retention time of 45.992.

Figure 2 displays the GC-MS analysis of *C. scariosus* aqueous distillate, while Figures 3, 4, and 5 exhibit the mass spectra and structures of trans-carveol, hexadecanoic acid, and octadecanoic acid, respectively.

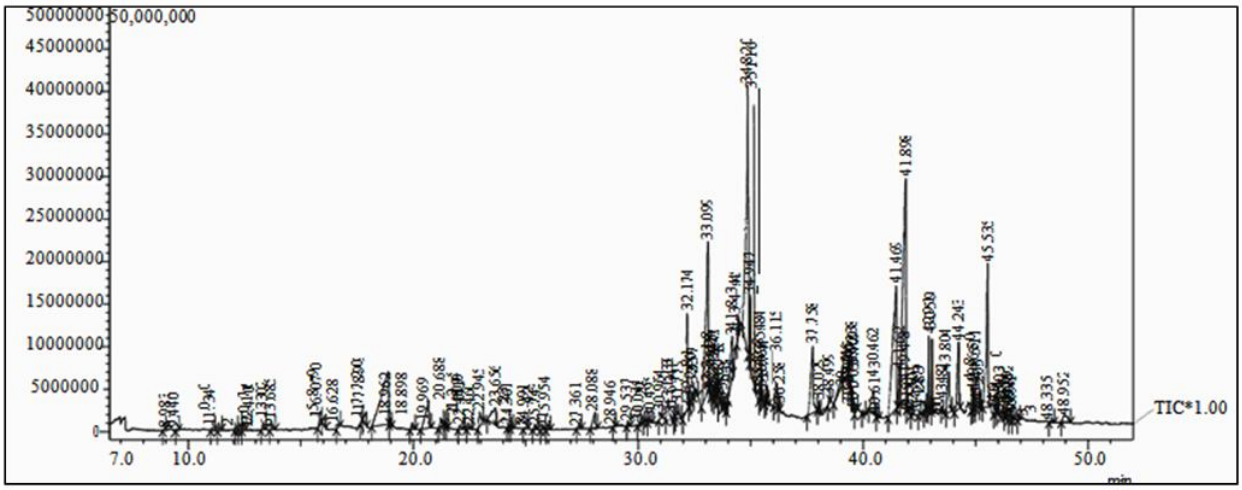

Figure 2: GC-MS analysis of aqueous distillate of *C. scariosus*.

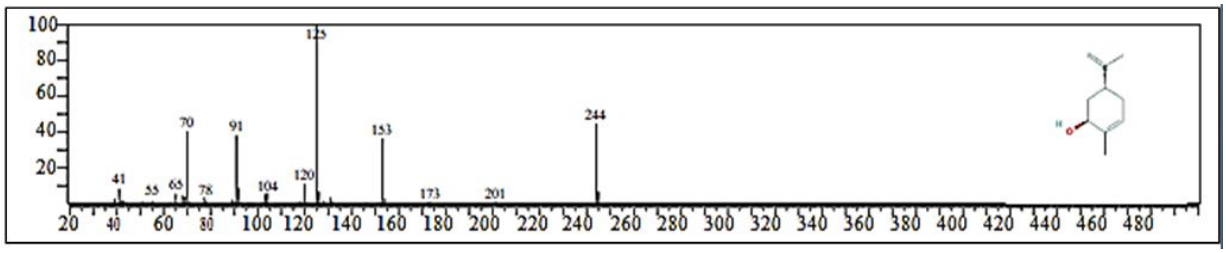

Figure 3: Mass spectrum of trans-carveol.

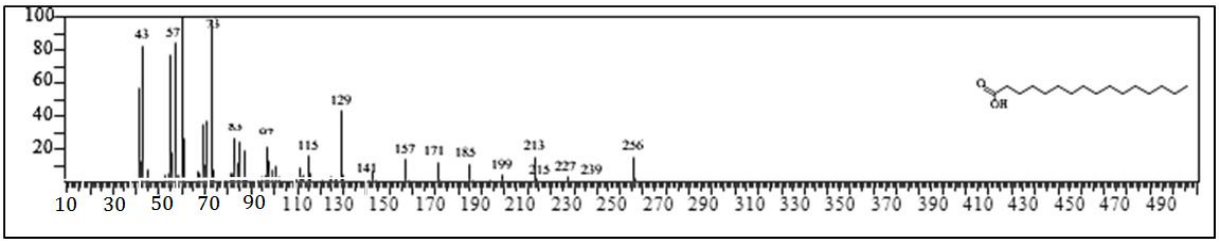

Figure 4: Mass spectrum of hexadecanoic acid.

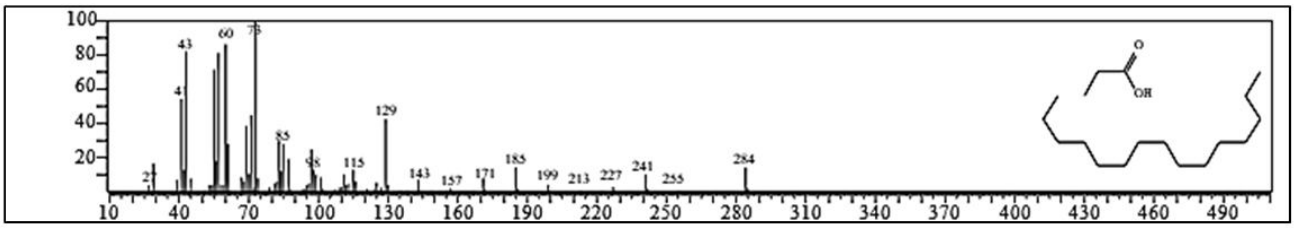

Figure 5: Mass spectrum of octadecanoic acid.

5. Discussion

The aqueous distillate of *C. scariosus* root contains soluble aqueous chemicals that are useful in treating many ailments (Yasukawa *et al.,* 2017). Therefore, the main argument support of using this plant as a direct agent for conventional primitive medicine. The GC-MS analysis confirmed the presence of distinct bioactive chemicals, which have been previously found and characterized in other medicinal plants too, but are rarely published (Biswas *et al.,* 2000; Yasukawa *et al.,* 2017; Cu *et al*., 2014). These chemicals might be responsible for the main bioactivities. The majority of these compounds have not been previously reported. However, they have been screened and identified in a variety of other herbal plants, including their biological activity.

To work on an aqueous distillate of *C. scariosus* is one of the novel efforts of research on that make this study novel and appropriate (Kanoujia *et al.,*2012). This study also provides evidence that the reported chemicals are accurately detected in a number of additional uncommon plants. It is a difficult work to extract atypical 105 bioactive substances from the aqueous distillate of such a plant for the treatment of unique ailments (Sandhu *et al*., 2011). Aqueous distillate of *C. scariosus* roots are economical and safe medicine for the treatment of various diseases (Ahmed *et al.,* 2011). The outcomes are in accordance with tribalcredence for which the people use conventional medicine for various bioactivities and treatment of diseases (Vijayendra *et al*., 2005).

There are number of known pharmacological activities for components already reported in GC-MS of *C. scariosus* aqueous distillate. These are given below:

Trans carveol: Anti-inflammatory, antioxidant (Soares *et al.,* 2005)

It is an unsaturated, monocyclic, naturally produced monoterpenoid alcohol. It is an oil-soluble, colourless fluid that is incapable of dissolving in water. A naturally occurring medication called carveol has been shown to have hepatoprotective, anti-inflammatory, anti-hyperlipidemic, antioxidant, and antidiabetic properties. Carveol has pharmacological action and confirmed binding affinity towards many target molecules (Peyman *et al.,*2013).

9-Octadecenoicacid: Antimicrobial and antioxidant (William *et al.,* 2010; Essien *et al*., 2012)

Majority of antimicrobial properties. and antioxidant activity was demonstrated by the methyl ester of 9-octadecenoic acid found in the methanol and acetone seed extract of *Cassia glauca*.

9-Octadecenoicacid (Z): Antimicrobial

The mushroom was taken out with petroleum ether, and the results showed that 9-octadecenoic acid had antibacterial activity.

Hexadecanoic acid: Antioxidant

A 95 per cent extract made from methanol of *Cassia italica* leaves, which included hexadecanoic acid, had 5-alpha reductase inhibitor, flavour, antioxidant, and hypocholesterolemic pesticide properties.

Pentadecanoicacid:Antimicrobial (Kumar *et al.,* 2011)

Pentadecanoic acid, found in Solanum essential oils, has considerable antibiotic properties. Furthermore, *S. erianthum* leaf oil has a strong cytotoxic potential against Hs 578T and PC-3 cells.

Tridecanoic acid: Antioxidant (Mohaammad *et al.,*2013)

Ethyl acetate extract of *Azadirachta indica* 50 µ gm/ml having tridecanoic acid, showed antioxidant activity.

1 Hexadecanol: Antimicrobial (Sarada *et al.,* 2001)

An ethanol extract of *Naringic renulata* leaves and bark, which included one hexadecanol, exhibited antimicrobial action based on its chemical composition.

4-Ethyl-o-xylene: Antioxidant (Gayathri *et al*., 2014)

Discovered in *Callitris columellaris* leaves that had been post-distilled, and the DPPH free radical scavenging test revealed its excellent antioxidant activity.

Dibutyl phthalate: Purging agent (Sermakkani *et al.*, 2012)

Act as purging agent for tumor cell.

1-Heneicosanol: Antioxidant (Wu *et al*., 1995)

Ethyl acetate extract of *Phyllanthus emblica* L. bark have 1-heneicosanol showed antioxidant activity.

9, 12-Octadecadienoic acid (z, z), methyl ester: Antimicrobial (Deepak *et al*., 2014)

Abrus precatorius Linn. leaf extracts in petroleum ether and ethanol, comprising 9,12-Octadecadienoic acid (z, z), methyl ester, had antibacterial activity and were also useful in treating coughs, the flu, eye infections, inflammation, inflammation of the skin, and bacterial and viral infections.

Mono-ethyl hexyl phthalate (MEHP): Antitumor (Gnanavel *et al*., 2013)

On MA-10 Leydig cancer cells and in Leydig cells, mono-ethyl hexyl phthalate (MEHP) can act as a mitochondria toxic substance and disruptor of lipid metabolism.

Cycloartane-3-beta., 25-diol: Antitumor (Deepak *et al.,* 2014)

48 natural and semisynthetic cycloartane-type and related tri terpenoids were evaluated for their inhibitory effect on Epstein-Barr virus early antigen (EBV-EA) stimulation induced by the tumor

promoter 12-O-tetradecanoyl phorbol -13-acetate (TPA) in Raji cells as a primary screening test for antitumor promoters. demonstrated inhibitory effects on the development of skin tumors in an *in vivo* two-stage mouse skin carcinogenesis assay where 7, 12-dimethylbenz [a] anthracene (DMBA) served as the initiator and TPA as the promoter.

Dihydrobrassicasterol: Cytotoxic (Suseem *et al.*, 2013)

Oxidized derivatives of dihydrobrassicasterol act as cytotoxic and apoptotic potential in U937 and HepG2 cells.

Lichesterol: Antifungal (Essien *et al.*, 2012)

The antifungal activity of the methanol extracts of lichens *Hypogymnia physodes* and *Cladonia foliacea* proved due to presence of Lichesterol.

Pentadecanal: Antimicrobial (Dees *et al.*, 2001)

Solanum essential oils have pentadecanal which possess strong antimicrobial activity in addition to the potent cytotoxic potential of *S. erianthum* leaf oil against Hs 578T and PC-3 cells.

8-octadecanone: Anti-inflammatory activity (Sijja *et al.*, 2014)

95% ethanol extract of *Bauhinia variegate* leaves have 8-octadecanone showed anti-inflammatory activity.

6. Conclusion

GC-MS study divulges the presence of numerous secondary products and bioactive molecules in the roots of *Cyperus scariosus*. The roots of *C. scariosus* utilised in the treatment of innumerable ailments. It is recognised to be abundant of dodecanoic acid, pentadecanoic acid, tridecanoic acid, t-butylhydroquinone, pentanoic acid, 4-methyl-, di-isononyl phthalate, (-)-trans-carveol, (-)-alpha-selinene, (+)-beta-selinene, hydrocinnamic acid, palmitoleic acid, indole, 3-methyl-, benzeneacetamide, limonene, acetamide, N-(2-phenylethyl)-, i-propyl 12-methyltetradecanoate, 3-isobutyl-2,5-piperazinedione, cyclo (L-prolyl-L-valine), 2-propenoic acid, 3-phenyl-, indole, 3-methyl-, Benzeneacetamide, *etc*. *C. scariosus* has countless crucial parts such as vital oils, terpenoids, sesquiterpenes, flavonoids and polyphenolic compounds and many of them possess incredible pharmaceutical activities.

Additionally, forthcoming research should induce synthesis of such complicated and enchanting chemical structures and its generics through modification/addition of divergent functional groups. In addition, it is essential to reveal the bioefficacy of isolated components when combined with additional herbs or medications. To ensure its potential and safety, it is also crucial to investigate the effects and mechanisms of the isolated compounds *in vivo* utilizing suitable higher animals.The current study extensively enlists the isolated compounds with its phytopharmacological activity in aqueous distillate.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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