Compounds from methanolic extract of Cissus Quadrangularis L. and Quantitation by GC-MS method

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Abstract- *Medicinal plants are used in various traditional systems namely Ayurvedic, Siddha and Unani. The present study showed the phytochemical analysis of various parts of Cissus quadrangularis L. (Leaves, stem, root and tendrils) belonging to the family Vitaceae. GC-MS analysis showed the presence of Eighty four chemical constituents from the methanolic extract of various plant parts. They are major compounds in various parts Cissus quadrangularis L. (Leaves-Olean-12-en-3-ol, acetate, (3, beta), stem-Beta-Amyrone, root- Beta-Amyrone and tendrils-Hexadecanoic acid). From the study of GC-MS analysis revealed that the methanolic extract showed maximum chemical constituent were present in root and stem than other parts of leaves and tendril of Cissus quadrangularis L. From the result of finding suggest that the Cissus quadrangularis L. have potential active compounds. However, further study needs to investigate the active compounds from these medicinal plants.*

Keywords- Cissus quadrangularis L. phytochemical, GC-MS and methanol

I. INTRODUCTION

Cissus quadrangularis L. is the most common species, commonly known as Perandai in Tamil and Edible Stemmed Vine in English. They are distributed throughout India particularly in tropical regions. It is a perennial climber reaching a height of 1.5 m and internodes 8 to 10 cm long and 1.2 to 1.5 cm wide. The leaves simple and opposite, 3-foliate and glabrous measure about 8 cm long and 6 cm broad. Stem is buff colored with greenish ting, dichotomously branched, sub- angular, glabrous, fibrous and smooth. Flowers are small, greenish white, bisexual, tetramerous, in umbellate cymes. Calyx is cup shaped. Fruit globose or obovoid fleshy berries, succulent, very acrid, dark purple to black, within one seeded, it is ellipsoid or pyriform. It has been used for bone fractures, scurvy, cancer, upset stomach, hemorrhoids, peptic ulcer disease (PUD), painful menstrual periods, asthma, malaria, and pain. Phytochemical investigation of plants may involved on plant authentification and extraction of the plant material, separation and isolation of the constituents of interest, characteration of the isolated compounds of biosynthetic of pathways to particular compounds and quantitative evolution parallel to this pharmacological of the separated components (Trease and Evans, 2005) The studies on methanol extract of *Cissus quadrangularis L.* revealed the presence tannins, alkaloids, flavonoids, carbohydrates, proteins, steroids, terpenoids. Alkaloids are the constituents of most various drugs. GC-MS is a powerful technique used for many applications which has very high sensitivity and specificity. Generally its application is oriented towards the specific detection and potential identification of compounds based on the molecular mass in a complex mixture. The combination of an ideal separation technique (GC) with the best identification technique (MS) made GC–MS an ideal technique for qualitative and quantitative analysis for volatile and semi-volatile compounds.

II. MATERIALS AND METHODS

Collection of Plant materials

Fresh and none infected Plant materials were collected from the village Ponnanthittu, Chidambaram Taluk, Cuddalore Dist, Tamil Nadu which lies between $11^0$47’ 70. 26’’ N and 79^0 79’’ 03.15’’E. Herbarium submitted to Annamalai University, Herbarium no: 352

Preparation of extracts

The leaf, stem, tendril and roots were dried in the shade and powdered so that all the material could be passed through a mesh not larger than 0.5 mm. Powdered materials of each plant (1000 g) were soaked in 3 liter of methanol (Merck Co., Germany) for one day, and the steps were repeated twice, followed by soxhlet apparatus by using methanol for 72 hrs. At the end of extraction, it was passed through Whatman filter paper No.1 (Whatman Ltd., England). The methanolic extract was concentrated to dryness under vaccum on rotary

evaporator at 40°c then reconstituted in minimum amount of DMSO and stored at 4°c for further use.

Preliminary phytochemicals screening

Pytochemical tests were studied or analysed on the methanolic extract of the powdered form of the various parts (Leaves, stem, root, tendrils) sample using standard qualitative methods as described by Edeoga *et al*., 2005; Harborne, 1998.

Qualitative analysis on phytochemical constituents they are same process in all parts.

Test for flavonoids

1% NH_3 solution is added to methanolic extract in test tube, of various parts in *C. quadarngularis*. (Leaves, stem, root, tendrils) A yellow coloration is observed if flavonoid compounds are present.

Test for tannins

0.5 g of powdered sample of PDME is boiled in 20 ml of distilled water in a test tube and then filtered. The filtration method used here is the normal method, which includes a conical flask and filter paper. 0.1% $FeCl_3$ is added to the filtered samples and observed for brownish green or a blue black coloration, which shows the presence of tannins.

Test for Carbohydrates

0.5ml of powdered sample of PDME, 5ml of Benedict's reagent was added and boiled for 5 minutes. Formation of bluish green colour showed the presence of carbohydrate solution was boiled for few minutes. In the presence of flavonoids, reddish pink or dirty brown colour was produced

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Test for alkaloids

5 ml of the PDME was added to 2ml of HCl. To this acidic medium, 1 ml of Dragendroff's reagent was added. An orange or red precipitate produced immediately indicates the presence of alkaloids.

Test for Proteins

A small amount of PDME, 5-6 drops of Million's reagent was added. A white precipitate which turns red on heating was formed and it is indicates the presence of proteins.

Test for steroids

1ml of the PDME was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. The upper layer turns red and sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids

Test for terpenoids

5 ml of methanolic extract is mixed with 2ml of $CHCl_3$ in a test tube. 3 ml of concentrated H_2SO_4 is carefully added to the mixture to form a layer. An interface with a reddish brown coloration is formed if terpenoids constituent is present.

GC-MS Analysis

Gas Chromatography – Mass Spectrometry analysis

GC-MS analysis was carried out in the Jawaharlal Nehru University (JNU), Delhi, India. GC clarus 2010 Perkin Elmer system comprising a AOC-20i autosampler and gas chromatograph interfaced to a mass spectrometer instrument employing the following conditions: column Elite-1 fused silica capillary column (30 X 0.25mm ID X 1μMdf, composed of 100% Dimethyl polydiloxane), operating in electron impact mode at 70e V; Helium gas (99.999%) was used as carrier gas at a constant flow of 1 ml/min and an injection volume of 0.5 μI was employed (split ratio of 10:1) injector temperature 250°C; ion-sources temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 min), with an increase of 10°C/min, to 200°C, then 5°C /min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70Ev; a scan interval 0.5 seconds and fragments from 40 to 450 Da. GC- running time is 36mm. the relative percentage amount of each component was calculated by comparing its average peak area to the total areas. Software adapted to handle mass spectra chromatograms was a Tubromass Ver 5.2.0[6].

III. RESULT

The plant extracts are having carbohydrates terpenoids, alkaloids, tannins, flavonoids, proteins the are shown in Table.1

In leaves:

The following compounds are isolated from the methanolic extract of leaves are shown in Table 2. 1,2-benzenedicarboxylic acid, 7,9-di-ter-butyl-1-oxaspiro (4,5) decane, 9-diene-2,8-dione, benzene dicarboxylic acid methylnonyl ester, n-Heneicosane,

Fig 1: GC-MS Chromatogram of methanolic stem extracts of *Cissus quadrangularis L*

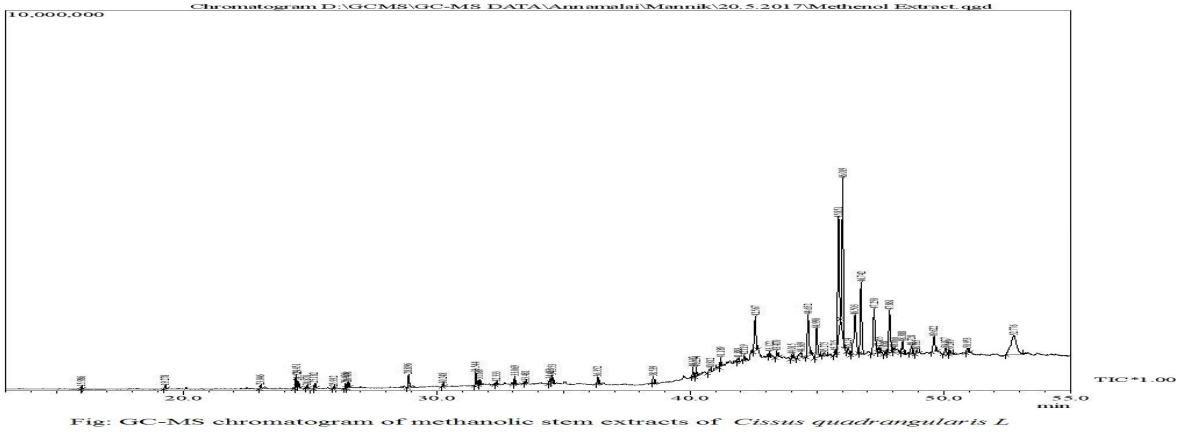

Fig: GC-MS chromatogram of methanolic stem extracts of *Cissus quadrangularis L*

Fig 2: GC-MS Chromatogram of methanolic leaves extracts of *Cissus quadrangularis L*

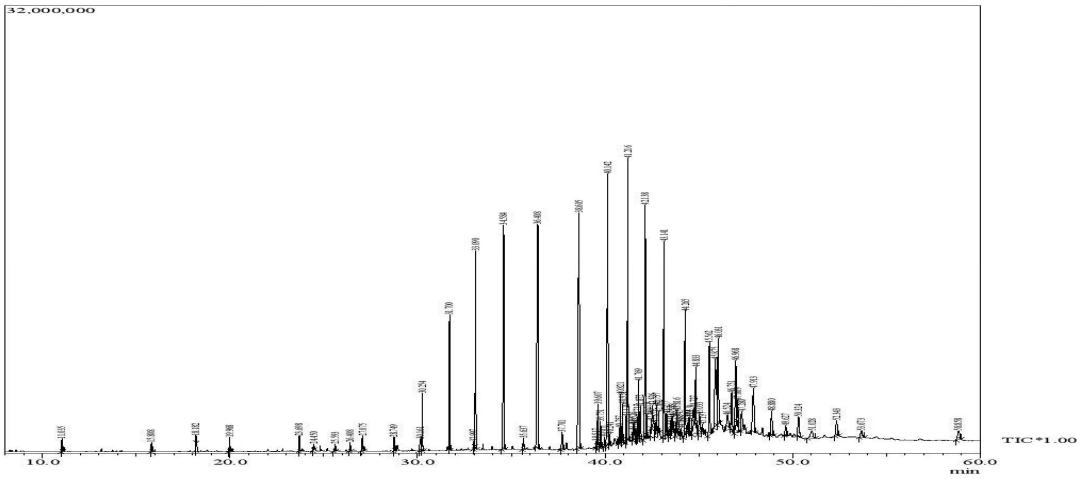

Fig-2. GC-MS chromatogram of methanolic leaves extract of *Cissus quadrangularis* L.

Fig 3: GC-MS Chromatogram of methanolic root extracts of *Cissus quadrangularis L*

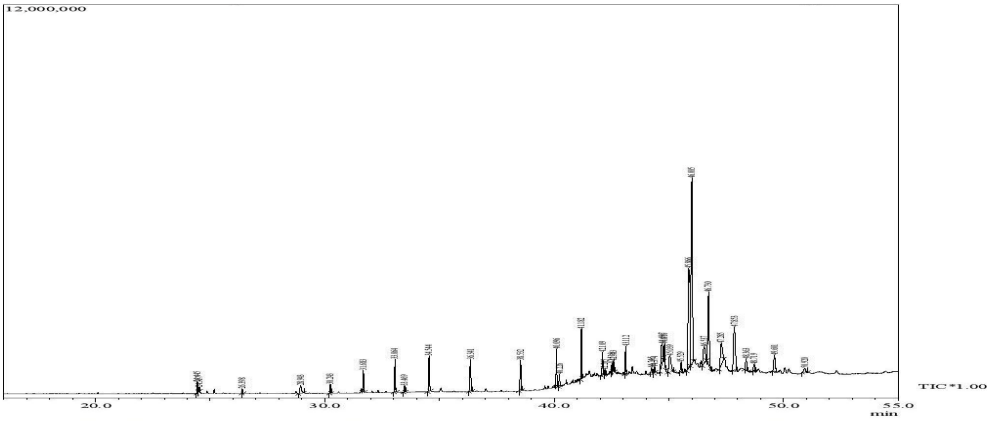

Fig-3.GC-MS chromatogram of methanolic root extract of *Cissus quadrangularis* L.

Fig 4: GC-MS Chromatogram of methanolic tendril extracts of *Cissus quadrangularis L*

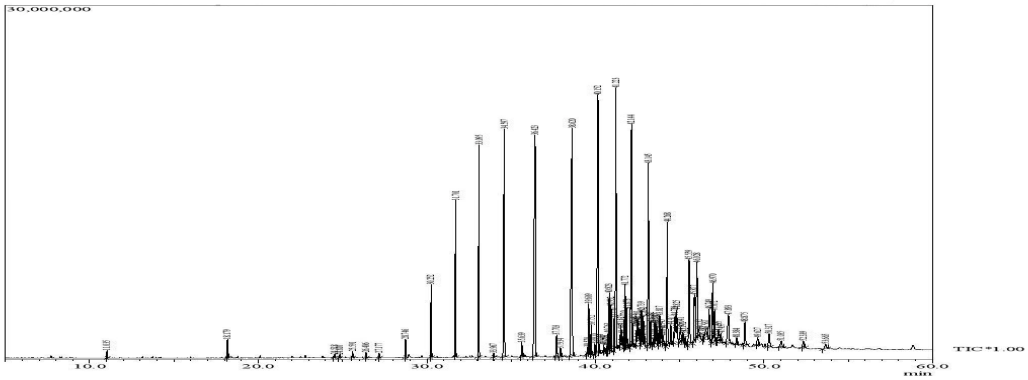

Fig-4.GC-MS chromatogram of methanolic tendril extract of *Cissus quadrangularis* L.

Table 1: leaves

S. No	R.Time	Area	Area%	Name	Molecular formula	Mole. wt
1	24.81	461642	0.05	1,2-Benzenedicarboxylic acid, bis (2-methylpropyl) ester	$C_{16}H_{22}O_4$	278
2	25.59	971775	0.10	7,9-Di-tert-butyl-1-oxaspiro(4,5) deca-6,9-diene-2,8-dione	$C_{17}H_{24}O_3$	276
3	26.40	934900	0.09	1,2-Benzenedicarboxylic acid, butyl 8-methylnonyl ester	$C_{22}H_{34}O_4$	362
4	31.70	31679158	3.16	Triacontane	$C_{30}H_{62}$	422
5	33.15	50137950	5.00	n-Heneicosane	$C_{21}H_{44}$	296
6	35.64	3764843	0.38	n-Tetracontane	$C_{40}H_{82}$	562
7	36.42	95599414	9.52	Hexadecanoic acid methyl ester	$C_{17}H_{34}O_2$	270
8	37.70	7225567	0.72	Tetratetracontane	$C_{44}H_{90}$	618
9	38.62	10371330	10.33	Olean-12-en-3-ol,acetate,(3.beta)	-	-
10	40.15	79675489	7.94	Phytol	$C_{20}H_{40}O$	296
11	40.82	8793800	0.88	Nor-Hexatriacontane	$C_{36}H_{74}$	506
12	41.77	10224925	1.02	Einecs 224-055-7	$C_{40}H_{82}$	562
13	42.55	802580	0.08	Oxalic acid, cyclohexylmethyl octadecyl ester	$C_{27}H_{50}O_4$	438
14	42.91	1209838	0.12	Docosyl trifluoroacetate	$C_{24}H_{45}F_3O_2$	422
15	43.65	2001827	4.91	Oxalic acid	$C_{22}H_{40}O_4$	368
16	43.82	4639967	0.46	Tetrapentacontane	$C_{54}H_{110}$	758
17	44.04	2109784	0.21	Eicosyl pentafluoropropionate	$C_{23}H_{41}F_5O_2$	444
18	44.29	31902272	5.58	Stigmast-5-en-3-ol, (3.Beta.,24S)-	$C_{29}H_{50}O$	414
19	44.73	5659883	0.56	1,54-Dibromotetrapentacontane	$C_{54}H_{108}Br_2$	914
20	44.48	4399374	0.44	Cyclohexane, nonadecyl-	$C_{25}H_{50}$	350
21	44.84	6341600	0.63	Henicosanal	$C_{21}H_{42}O$	310
22	45.04	5668023	0.56	Triacontane	$C_{30}H_{62}$	422
23	45.19	2103782	0.21	Hentriacontane	$C_{31}H_{64}$	436
24	45.33	1865122	0.19	Trifluoroacetate	$C_{40}H_{77}F_3O_2$	646
25	45.56	27114865	2.70	Behenic alcohol	$C_{22}H_{46}O$	326
26	45.88	24173964	3.18	Pentyl triacontyl ether	$C_{35}H_{72}O$	508
27	46.97	18801002	1.87	Phenol, 2,4-bis(1,1-dimethylethyl)-, phosphite (3:1)	$C_{42}H_{63}O_3P$	646
28	47.17	575028	0.06	Tetratriacontyl pentafluoropropionate	$C_{37}H_{69}F_5O_2$	640
29	47.89	15684256	1.56	Flavone 4'-oh,5-oh,7-di-o-glucoside	$C_{27}H_{30}O_{15}$	594

30	50.3	6315588	0.63	5,11,17,23-Tetratert-butylpentacyclo[19.3.1.1~	$C_{44}H_{56}O_4$	648
31	53.67	2647271	0.26	Tetracontane	$C_{40}H_{82}$	562

Table 2: Stem

Peak#	R.Time	Area	Area%	Name of Compounds	Molecular formula	Mole. wt
1	34.55	634885	0.63	n-Tetracontane	$C_{40}H_{82}$	562
2	38.54	629675	0.63	Tetracontane	$C_{44}H_{90}$	618
3	40.23	576140	0.58	Thiocyanic acid, 4.alpha.-methyl-5.alpha.-cholestan-3.alpha.	$C_{29}H_{49}NS$	443
4	40.81	586043	0.59	Tetrapentacontane	$C_{54}H_{110}$	758
5	41.88	344835	0.34	Hexacontane	$C_{60}H_{122}$	842
6	42.12	209962	0.21	Hexatriacontane	$C_{36}H_{74}$	506
7	43.12	374710	0.37	1-Bromotetracosane	$C_{24}H_{49}Br$	416
8	44.02	320936	0.32	Methyl Commate A	$C_{32}H_{52}O_4$	500
9	44.65	5074528	5.08	Pregnane-3,11,20,21-Tetrol, Cyclic 20,21-[(1,1-di	$C_{25}H_{43}BO_4$	418
10	45.85	13776144	13.78	Ergost-5-en-3-ol, (3.Beta.,24R)-	$C_{28}H_{48}O$	400
11	46.20	15010919	15.01	Beta.-Amyrone	$C_{30}H_{48}O$	424
12	46.50	6967385	6.97	4,4,6A,6B,8A,11,11,14B-Octamethyl-1,4,4A,5,6,6A,6B	$C_{30}H_{48}O$	424
13	46.74	8057420	8.06	D-Norandrostane-16-methanol, (5.alpha.,16.beta.)-	$C_{19}H_{32}O$	276
14	47.25	6531392	6.53	24-Norursa-3,12-diene	$C_{29}H_{46}$	394
15	47.86	5330028	5.33	Cholest-4-en-3-one	$C_{27}H_{44}O$	384
16	49.62	2082095	2.08	03027205002 Flavone 4'-oh,5-oh,7-di-o-Glucosid	$C_{27}H_{30}O_{15}$	594
17	52.78	7988938	7.99	Solanesol	$C_{45}H_{74}O$	630

TABLE 3: TENDRIL

Peak#	R.Time	Area	Area%	Name	Molecular formula	Mole.Wt
1	25.59	1325225	0.16	7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione	$C_{17}H_{24}O_3$	276
2	26.41	1412823	0.17	1,2-Benzene dicarboxylic acid, butyl 8- ethylnonyl ester	$C_{22}H_{34}O_4$	362

3	34.58	53391923	6.35	Alpha-to copheryl-beta-d-mannosid	$C_{35}H_{60}O_7$	592
4	35.64	2506705	0.30	n-Tetratetracontane	$C_{44}H_{90}$	618
5	36.41	70521718	8.39	Tetracontane	$C_{40}H_{82}$	562
6	38.61	79897839	9.50	Hexadecanoic acid	$C_{34}H_{66}O_2$	506
7	40.14	64931077	7.72	beta.-Amyrin	$C_{32}H_{52}O_2$	468
8	41.22	55950732	6.65	Methyl Commate B	$C_{31}H_{50}O_3$	470
9	41.64	1029497	0.12	Tetratetracontane	$C_{44}H_{90}$	618
10	40.76	1608529	0.19	Hexacosane	$C_{26}H_{54}$	366
11	40.82	6318014	0.75	Germacrane-C	$C_{15}H_{30}$	210
12	40.93	5532196	0.66	1,2,4,5-Tetraethylcyclohexane	$C_{14}H_{28}$	196
13	41.12	3234270	0.38	13-Tetradecen-1-ol acetate	$C_{16}H_{30}O_2$	254
14	42.14	47600061	5.66	13,27-Cycloursan-3-one	$C_{30}H_{48}O$	424
15	43.95	1960495	0.23	Triacontane, 1-iodo-	$C_{30}H_{61}I$	548
16	44.04	1568789	0.19	Triacontyl heptafluorobutyrate	$C_{34}H_{61}F_7O_2$	634
17	44.27	26259989	3.12	Nor-Hexatriacontane	$C_{36}H_{74}$	506
18	44.27	26259989	3.12	Nor-exatriacontane	$C_{36}H_{74}$	506
18	46.52	4511217	0.54	Methyl Commate A	$C_{32}H_{52}O_4$	500
19	46.97	18764862	2.23	Phenol, 2,4-bis(1,1-dimethylethyl)-, phosphite (3:1)	$C_{42}H_{63}O_3P$	646
20	47.28	7370843	0.88	Methyl Commate D	$C_{31}H_{50}O_4$	486
21	49.63	3346835	0.40	03027205002 Flavone 4'-oh,5-oh,7-di-o-glucoside	$C_{27}H_{30}O_{15}$	594
22	50.32	7911056	0.94	5,11,17,23-Tetratert-butylpentacyclo[19.3.1.1~	$C_{44}H_{56}O_4$	648
23	53.67	3218673	0.38	Tetrapentacontane	$C_{54}H_{110}$	758

TABLE 4: ROOT

Peak#	R.Time	Area	Area%	Name	Molecular formula	Mole. wt
1	26.40	300838	0.27	Dibutyl phthalate	$C_{16}H_{22}O_4$	278
2	40.10	2344683	2.13	Tetracontane	$C_{44}H_{90}$	618
3	41.18	2771342	2.51	Hexatriacontane	$C_{36}H_{74}$	506
4	42.11	1739680	1.58	n-Tetracontane	$C_{40}H_{82}$	562
5	43.11	1998437	1.81	Tetratetracontane	$C_{44}H_{90}$	618
6	44.26	412235	0.37	α-d-galactopyranose, 6-O-(2,3,5-TRI-O-AC	$C_{23}H_{34}O_{13}$	518
7	45.53	923716	0.84	n-Tetratetracontane	$C_{44}H_{90}$	618
8	45.87	17944391	16.27	gamma.-Sitosterol	$C_{29}H_{50}O$	414
9	46.01	256283	23.24	beta.-Amyrone	$C_{30}H_{48}O$	424

		34				
10	46.73	8930613	8.10	Lup-20(29)-en-3-one	$C_{30}H_{48}O$	424
11	47.29	4090866	3.71	Methyl Commate D	$C_{31}H_{50}O_4$	486
12	47.85	7518640	6.82	Stigmast-4-en-3-one	$C_{29}H_{48}O$	412
13	49.60	2396749	2.17	Flavone 4'-OH,5-OH,7-Di-O-Glucosid	$C_{27}H_{30}O_{15}$	594

Table 5: The preence of secondary metabolic in the cissus quadarangularis.L

S.No	Name of the compounds	Leaves	Stem	Tendril	Roots
1	Flavonoids	++	+	+	+
2	Tannins	++	+	+	+
3	Carbohydrates	+	+	+	+
4	Alkaloids	++	+	+	+
5	Proteins	++	+	+	+
6	Steroids	++	++	++	++
7	Terpenoids	++	+	+	+

Phenol, 24-bis(phenylethyl), n-Tetracontane Tetratetracontane, phytol, nor- Hexatriacontane, Einecs 224, oxalic acid, cyclohexymethyl octadecyl ester, dococyl trifluoroacetate, oxalic acid, Tetrapentacontane, Eicosyl pentafluoropropionate, stigmast-5-en-3-ol, 1,54-dibromotetrapentacontane, trifluoroacetate, Pentyltriacontyl ether, phenol, 2,4-bis(1,1-dimethylethyl phosphite), tetraacontylpentafluoropropionate, flavone 4-oh,5-oh,7-di-o-glucoside, 5,11,17,23-Tetratert-butylpentacyclo [19.3.1.1~, Tetracontane.

In stem:

The following compounds are isolated from the methanolic extract of stem are shown in Table 3. n-Tetracontane, Thiocyanic acid, 4.α.-methyl-5. α-cholestan-3. α., Tetrapentacontane, Einecs 211-123-6, Hexacontane, Hexatriacontane, i-Propyl 5,9,19-octacosatrienoate, 1-Bromotetracosane, Methyl Commate A, Pregnane -3,11,20,21-Tetrol, Cyclic 20,21-[(1,1-di], Ergost-5-en-3-ol, (3.Beta.,24R),4,4,6A,6B,8A,11,11,14B-Octamethyl,α-Amyrone,D-Norandrostane-16-methanol, 24-Norursa-3,12-diene, Cholest-4-en-3-one, Flavone 4'-oh,5-oh,7-di-o-Glucoside, Solanesol.

Tentril:

The following compounds are isolated from the methanolic extract of stem are shown in Table 4. 7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione, 1,2-Benzenedicarboxylic acid, butyl 8-methylnonyl ester, Docosane, Alpha-to copheryl-beta-d-mannoside, n-Tetratetracontane, Hexadecanoic acid, Hexacosane, 1-iodo, β-Amyrin, Methyl Commate B, Tetratetracontane, 13,27-Cycloursan-3-one, Palmitaldehyde, Triacontane, 1-iodo, Triacontyl heptafluorobutyrate, Nor-Hexatriacontane, Methyl Commate A and D, Phenol, 2,4-bis(1,1-dimethylethyl) phosphite, Flavone 4'-oh,5-oh,7-di-o-glucoside, 5,11,17,23-Tetratert-butylpentacyclo[19.3.1.1~], Tetrapentacontane.

Root:

The following compounds are isolated from the methanolic extract of roots are shown in Table 5. Dibutyl phthalate, Tetracontane, n-Tetracontane, Tetratetracontane, Stigmasterol, γ-Sitosterol, β-Amyrone, Lup-20(29)-en-3-one, Methyl Commate D, Stigmast-4-en-3-one, Flavone 4'-OH, 5-OH,7-Di-O-Glucoside.

IV. DISCUSSION

Cissus quadrangularis L. root contains constituents such as phenolic compounds, tannins, proteins, saponins, steroids, carbohydrates, glycosides and triterpenoids etc in alcoholic and aqueous extract. For both stem and root glycosides has present high in methanolic extracts (Kokate, 2000). Prabhadevi *et al.,* 2014 reveled that phytochemical compounds of *Allamanda cathartica* (A. cathartica) L. using GC-MS. They determined that 28 different phytochemical compounds from ethanolic leaf extract.

Phytochemical studies of *Cissus quadrangularis* have shown the presence of various versatile constituents such as flavanoids, triterpenoids, Vitamin C, stilbene derivatives and many others, e.g. resveratrol, piceatannol, pallidol perthenocissin and phytosterols. Out of which ascorbic acid,

triterpene, β-sitosterol, ketosteroid, two asymmetrical tetracyclic triterpenoids and calcium were identified as major constituents of this plant Jainu and Devi 2004: Enechi and Odonwodo 2003: Shirley and Sen 2003.

The *Cissus quadrangularis* contains high amount of Carotene A, anabolic steroidal substances and Calcium. The plant contains ascorbic acid, 479 mg and carotene, 267 mg per 100 g freshly prepared paste, in addition to calcium oxalate. The stem of the plant contains two asymmetric tetracyclic triterpenoids, onocer – 7 ene 3 α, 21 β diol ($C_{30}H_{52}O_2$ m.p. 200 – 202 °C) and onocer - 7 ene – 3 β, 21 α diol ($C_{30}H_{52}O_2$, m.p. 233 – 234 °C). It also contains two steroidal principles – 1. $C_{27}H_{45}$ O, melting point 249-252 °C 2. $C_{23}H_{41}$ O, melting point 136-138 °C Presence of β-sitosterol , δ amyrin and δ- amyrone is also reported. The aerial parts of Cissus quadrangularis is found to contain a new asymmetric tetracyclic triterpenoid, 7-Oxo-Onocer-8-ene-3 β 21 α diol ($C_{30}H_{50}O_3$, m.p. 235-237 °C) Sen 1966, Bhutani et al. 1984, Saburi et al 1999, Ambasta 1992, Chopra 1999.

Seven new compounds are also reported which are 4-hydroxy 2 methyl-tricos-2 ene -22- one, 9-methyloctadec- 9-ene, heptadecyl- octadecanoate, icosanylicosanoate, 31-methyl tritiacontan-1-ol, 7- hydroxy- 20- oxo- docosanyl cyclohexane and 31-methyl tritiacontanoic acid. Small amount of taraxeryl acetate, friedelan-3-one, taraxerol and isopentacosanoic acid is also present. Presence of 3, 3', 4, 4'- tetrahydroxybiphenyl is also reported Chopra et al 1958; Gupta and verma 1991; Pluemjai and Saifah 1986.

Analysis of the air-dried *Cissus quadrangularis* plant reported to contain moisture 13.1, protein 12.8, wax 1.0, fiber 15.6, carbohydrate 36.6, mucilage and pectin 1.2 and ash 18.2%. The root powder also contain a rich source of mineral elements (mg/100g dry matter): potassium 67.5, calcium 39.5, zinc 3.0, sodium 22.5, iron 7.5, lead 3.5, cadmium 0.25, copper 0.5 and magnesium 1.15, Somova 2003; Khan 1991; Kumbhojkar 1991; Udupa 1970; Maxwell 1995.

V. CONCLUSION

From the study of GC-MS analysis revealed that the methanolic extract showed maximum chemical constituent were present in root and stem than other parts of leaves and tendril of *Cissus quadrangularis* L. From the result of finding suggest that the *Cissus quadrangularis* L. have potential active compounds. However, further study needs to investigate the active compounds from these medicinal plants.

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