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Chemical fingerprints for *Panchavalkala Kvatha Curna*

Panchavalkala Kwatha Curna **(PKC) is an important poly-herbal formulation of Ayurveda used in the treatment of inflammation due to wound, ulcer, syphilis, leucorrhoea and conjunctivitis. Physico-chemical studies *viz.* total ash, water soluble ash, acid insoluble ash, water, alcohol and hydro – alcohol soluble extractive, loss on drying at 105°C, pH, HPTLC and LC-MS PKC and a monograph on quality standards for PKC is proposed from the data obtained to serve as a document to control the quality.**

Koppala Narayana et al.

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Original Article

Chemical fingerprints for *Panchavalkala Kvatha Curna*

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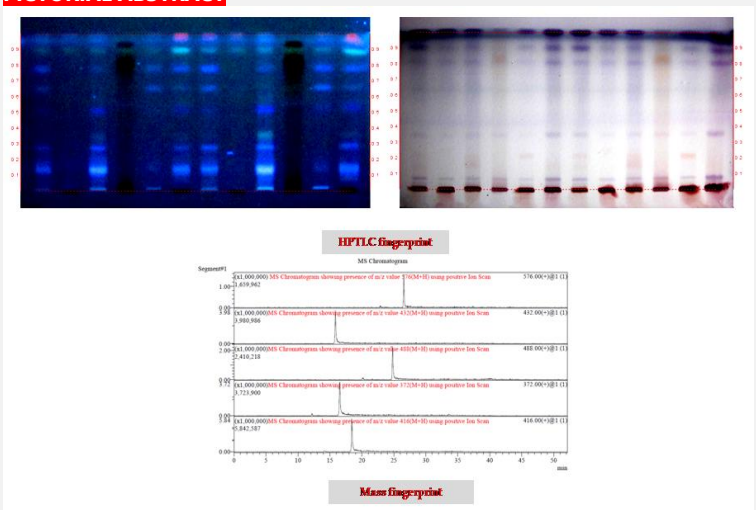
ABSTRACT

Introduction: Herbal medicines in recent times gained popularity and glory because of lesser known side effects/adverse effects and palatable and indispensable in its own way. Standardization as a benchmark to ascertain the quality, purity, safety and efficacy of the individual drug. *Panchavalkala kvatha curna* (PKC) is a polyherbal formulation, compounded from parts of *Nyagrodha (Ficus benghalensis* – stem bark), *Udumbara (Ficus racemosa* – stem bark), *Asvattha (Ficus religiosa* – stem bark), *Parisa (Thespesia populnea* – stem bark) and *Plaksa (Ficus lacor* – stem bark) as per formula composition in Ayurvedic Formulary of India. It is used in the treatment of inflammation due to wound, ulcer, syphilis, leucorrhoea and conjunctivitis. It can be used as lepa or in the form of decoction. In the current study chemical analysis and fingerprinting techniques have been employed to standardise PKC. ***Methods*:** PKC was subjected to organoleptic, macro-microscopic, physicochemical, HPTLC and LC-MS characterization employing standard methodology mentioned in pharmacopoeia and other herbal analysis protocols. ***Results:*** Physico-chemical studies *viz.* total ash, water soluble ash, acid insoluble ash, water, alcohol and hydro – alcohol soluble extractive, loss on drying at 105°C, pH, HPTLC and LC-MS were performed. ***Conclusion*:** A monograph on quality standards for PKC is proposed from the data obtained. The results of the present investigation would serve as a document to control the quality of an important poly-herbal formulation of Ayurveda.

KEYWORDS HPTLC, LC-MS fingerprint, monograph, polyherbal formulations, standardization.

PICTORIAL ABSTRACT



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1. INTRODUCTION

Quality, safety and efficacy tests for obtaining standards for Ayurvedic preparations are to be considered with due importance[1]. Approval for quality standards, since authentication of botanical source of ingredients to preparation of finished product, each of the process has its own importance. Since there are several active principles in a single herbal drug ingredient standardisation of formulations with multiple crude drugs is a difficult task unlike modern drugs. Every herbal formulation in the Ayurvedic formulary needs standardisation employing all possible chemical means[2].

Panchavalkala kvatha cūrṇa (PKC) is prescribed in conditions of inflammation due to wounds, syphilis, leucorrhoea, conjunctivitis as external therapyafter grinding with ghritha or as decoction. PKC is composed of coarse powder of stem barks of *Nyagrodha* (*Ficus benghalensis* L.), *Udumbara* (*Ficus racemosa* L.), *Asvattha* (*Ficus religiosa* L.), *Parisa* (*Thespesia populnea* (L.) Sol. ex Correa) and *Plaksa* (*Ficus lacor* Buch.-Ham.) in equal proportions as mentioned in Ayurvedic Formulary of India (AFI)[3]. The current study attempts to develop monograph on quality control parameters for PKC using physico – chemical, HPTLC and LCMS analytical tools.

2. MATERIALS AND METHODS

2.1 Collection and identification of plant samples

Dry raw samples were collected from the raw drug section of SDM Ayurveda pharmacy, Udupi as well as some authentic raw material suppliers. The samples were authenticated using macro-microscopic examination, voucher specimens (No. SDM/RGU-MRP/PKC/01-05) have been deposited in the crude drug museum of Pharmacognosy department of SDMCRAAS, Udupi, Karnataka.

2.2 Method of Preparation of Panchavalkala kvātha cūrṇa

There is no protocol for the preparation of kvātha cūrṇa (coarse powder) in Ayurvedic Pharmacopoeia of India (API) though there is protocol for preparation of cūrṇa (fine powder). PKC was prepared as per procedure detailed for cūrṇa in API[4], with modification of sieve size (10 was used). All the ingredients of Pharmacopoeial quality were washed separately to have no microbial load[5], dried, and coarsely powdered. The individual raw drug powders were passed separately through sieve number 10. Each ingredient was weighed separately and mixed together in equal proportions as per AFI[3]. The mixture was passed through sieve number 10 again to obtain a homogenous blend and packed in an air-tight container.

2.3 Physico-chemical analysis

Physico-chemical studies *viz.* total ash, water soluble ash, acid insoluble ash, water, alcohol and hydro – alcohol soluble extractive, loss on drying at 105°C and pH were carried out as per the standard procedures mentioned in API[6].

2.3 TLC/HPTLC fingerprinting

2.3.1 Ethanol extraction of ingredients and PKC

Five grams each of *Nyagrodha, Udumbara, Asvattha, Parisa, Plaksa* and PKC were extracted with 150 ml of ethanol using Soxhlet apparatus. The filtrate was concentrated to dryness and 100 mg of dried residue was dissolved in 5 ml of solvent in a standard flask individually[7].

2.3.2 Hydro-alcoholic extraction of PKC.

Five grams of PKC was extracted with ethanol and water (1:1) by maceration at room temperature for 24hrs with intermittent shaking followed by filtration and concentrating to 5 ml.

2.3.3 HPTLC

2.3.3.1 Ethanol extract of PKC along with the extracts 5 ingredients were applied (10µl each) on aluminium plates pre-coated with silica gel 60 F_{254} of 0.2 mm thickness using LINOMAT 5. The plate was developed in twin trough chamber previously saturated with mobile phase toluene: ethyl acetate: formic acid (5.0: 5.0: 0.2).

2.3.3.2 Hydro-alcoholic extract was applied to the concentrations of 4 and 8 µl on aluminium plates pre-coated with silica gel 60 F_{254} of 0.2 mm thickness using LINOMAT 5. The plate was developed in twin trough chamber previously saturated with mobile phase toluene: ethyl acetate: acetic acid: water (3.0: 3.0: 0.8: 0.2).

The developed plate was visualized in visualizing chamber and scanned in CAMAG TLC scanner 4 under 254, 366 (pre-derivatisation) and at 620 nm (post-derivatisation with vanillin – sulphuric acid (VSA)). With the help of CAMAG WinCATS software, R_f values and densitograms were recorded[8,9].

2.4 LCMS fingerprinting

In order to perform a qualitative analysis of the compounds present in PKC methanolic extract was analysed by LC/ESI/MS using Bruker UHPLC 3000 chromatography coupled to a quadrupole ToF mass selective detector (micrOTOF-QII). The operating conditions were as follows: column RP C18 (100 mmx3.9mm), internal diameter = 5µm; elution gradient; mass spectra negative ion mode; mobile phase: 0.5 ml of ortho phosphoric acid and 136 mg of KH_2PO_4 dissolved in 900 ml of HPLC grade water, made up to 1000 ml filtered through 0.45µ membrane and degassed in sonicator for 5 min (Solvent A), acetonitrile (Solvent B); flow rate 1.2 ml /min; injection volume 25mg/10ml methanol[10].

3. RESULTS AND DISCUSSION

Standardisation parameters are set by considering the importance of each test *viz* loss on drying, total ash content, acid insoluble ash, alcohol soluble extractive value and water soluble extractive value to assure uniformity in manufacturing and considering efficacy and safety. Physico – chemical constants for all the ingredients and the preparation PKC was estimated (Table 1). The physico – chemical constants for all the ingredients used in the preparation of PKC as well the same for PKC will be useful in quality control lab in future.

HPTLC profile by photo-documentation (Figure 1), densitometry (Figure 2-5) and R_f values (Table 2-4) has been generated for PKC along with the 5 ingredients. Hydro-alcoholic extract of PKC was also fingerprinted in a mobile phase suitable for that polarity (Table 5, Figure 6, 7). Fingerprint patterns were documented under short UV, long UV and after derivatisation with VSA.

Under short UV *Nyagrodha, Udumbara, Asvattha* and *Plaksa* showed no bands while *Parisa* showed 2 green bands and PKC showed 4 bands 2 of them corresponded to *Parisa* (Figure 1.1 and Table 2).

Under long UV *Nyagrodha, Udumbara, Asvattha, Parisa, Plaksha* and PKC showed 7, 2, 9, 6, 6, and 9 bands respectively (all in blue fluorescent colour). Nine bands occurred in PKC, of them 8 were from 5 of ingredients used in the formulation. Band with R_f 0.08 was formed after compounding of the ingredients to PKC. Band with R_f 0.14, 0.66 and 0.78 were observed in *Nyagrodha, Asvattha* and *Plaksa*. Band with R_f 0.83 and 0.94 (fluorescent black) were observed in *Parisa*. Band with R_f 0.90 (F. Aqua) and 0.98 (F. Blue) was observed commonly in

Nyagrodha, Udumbara, Asvattha, Parisa, and *Plaksha* (Figure 1.2 and Table 3).

After derivatisation with VSA, *Nyagrodha, Udumbara, Asvattha, Parisa, Plaksha* and PKC showed 8, 6, 8, 5, 6 and 5 bands respectively (of different colours). Out of five bands occurred in PKC, 3 were from 4 of ingredients used for the formulation, and 2 were from five ingredients used in PKC. Bands with R_f 0.06, 0.35 (violet) were observed in all the five ingredients and bands with R_f 0.81, 0.90, 0.99 (violet) were observed in *Nyagrodha, Udumbara, Asvattha* and *Plaksha* (Figure 1.3 and Table 4).

Densitometric scan of PKC showed 5, 5 and 8 peaks at 254, 366 and 540 nm after derivatisation with VSA (Figure 2.6, 3.6, 4.6).

HPTLC performed for hydro-alcoholic extract of PKC at short UV showed 4 bands (green) at long UV showed 11 bands (fluorescent light violet) and after derivatisation (white light) showed 6 bands (light violet) respectively. Densitometric scan carried out showed 6 peaks at 254nm, 4 peaks at 366nm and 4 peaks at 620nm (after derivatisation with VSA) (Table 5).

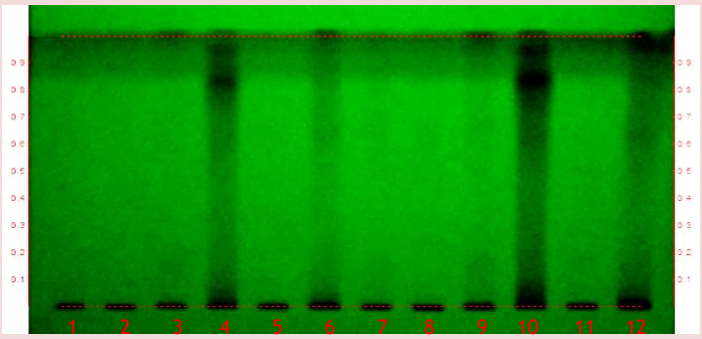
Methanolic extract of PKC along with its 5 ingredients were analysed using LCMS for qualitative fingerprint purpose (Figure 8-9). The fingerprint has shown peaks from each extract.

Table 1. Raw data of physico-chemical constants of raw materials used in *Panchavalkala kvatha curna*

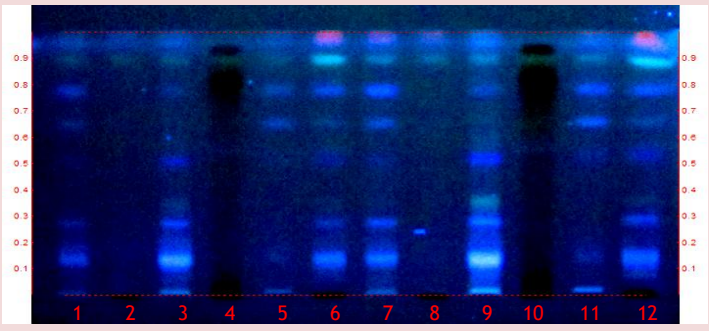
Sample	LOD	TA	AIA	ASE	WSE	pH
Nyagrodha	8.13 ± 0.30	4.99 ± 0.05	0.45 ± 0.05	6.26 ± 0.40	9.28 ± 0.14	-
Udumbara	11.04 ± 0.03	17.04 ± 0.05	0.30 ± 0.00	11.93 ± 0.20	10.26 ± 0.54	-
Asvattha	8.16 ± 0.03	7.90 ± 0.18	0.65 ± 0.145	8.96 ± 0.325	10.25 ± 0.38	-
Parisa	7.54 ± 0.34	12.31 ± 0.08	1.35 ± 0.05	7.67 ± 0.47	8.51 ± 1.03	-
Plaksa	6.24 ± 0.06	8.84 ± 0.04	1.10 ± 0.10	15.95 ± 0.00	9.52 ± 0.01	-
PKC	7.68 ± 0.05	9.83 ± 0.0	0.60 ± 0.0	15.95 ± 0.0	7.44 ± 0.18	6.0 ± 0.0

Results expressed as average ± SEM of % w/w. LOD – Loss on drying at 105°; FM - Foreign matter; TA - Total ash; AIA – Acid Insoluble ash; ASE – Alcohol soluble extractive; WSE – Water soluble extractive. PKC - Panchaalkala kvatha chrna

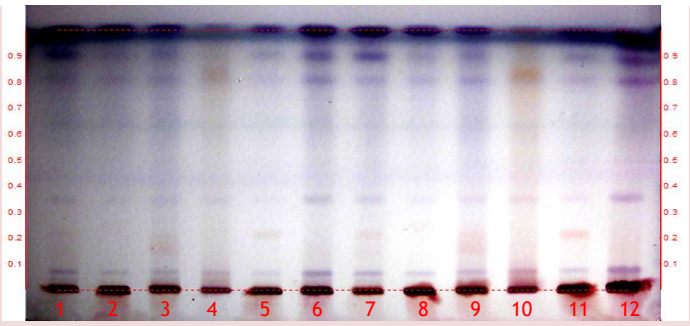
Figure 1. TLC photo documentation of Ethanolic extract of *Panchavalkala Kvatha Curna* with Ingredients



1.1 Under short UV



1.2 Under long UV



1.3 Under white light post derivatisation

Solvent system - Toluene: Ethyl Acetate: Formic Acid (5:5:0.2)

Track 1 - Nyagrodha (*Ficus benghalensis*); Track 2 - Udumbara (*Ficus racemosa*); Track 3 - Asvattha (*Ficus religiosa*); Track 4 - Parisa (*Thespesia populnea*); Track 5 - Plaksa (*Ficus lacor*); Track 6 - *Panchavalkala Kvatha Curna* (PKC)

Table 2. R_f values of ingredients and *Panchavalkala Kvatha Curna* under short UV

Nyagrodha	Udumbara	Asvattha	Parisa	Plaksa	PKC
-	-	-	-	-	0.64 L Green
-	-	-	0.84 D Green	-	0.84 L Green
-	-	-	0.95 D Green	-	0.95 L Green

D – Dark; L –Light

Table 3. R_f values of ingredients and *Panchavalkala Kvatha Curna* under long UV

Nyagrodha	Udumbara	Asvattha	Parisa	Plaksa	PKC
-	-	-	-	-	0.08 F L Blue
0.14 F Blue	-	0.14 F Blue	-	0.14 F L Blue	0.14 F Blue
0.28 F Blue	-	0.28 F Blue	-	-	0.28 F Blue
-	-	0.36 F Aqua	-	-	0.36 F Aqua
0.51 F L Blue	-	0.51 F D Blue	-	-	-
-	-	-	0.54 F L Blue	0.54 F Blue	0.54 F Blue
-	-	0.60 F L Green	-	-	-
0.66 F L Blue	-	0.66 F L Green	0.66 F L Green	0.66 F Blue	0.66 F L Blue
0.78 F Blue	-	0.78 F L Blue	-	0.78 F Blue	0.78 F Blue
-	-	-	0.83 F Black	-	-
0.90 F Aqua	0.90 F Aqua	0.90 F Aqua	0.90 F Aqua	0.90 F Aqua	0.90 F aqua
-	-	-	0.94 F Black	-	-
0.98 F L Pink	0.98 F L Pink	0.98 F L Blue	0.98 F L Blue	0.98 F L Pink	0.98 F Red

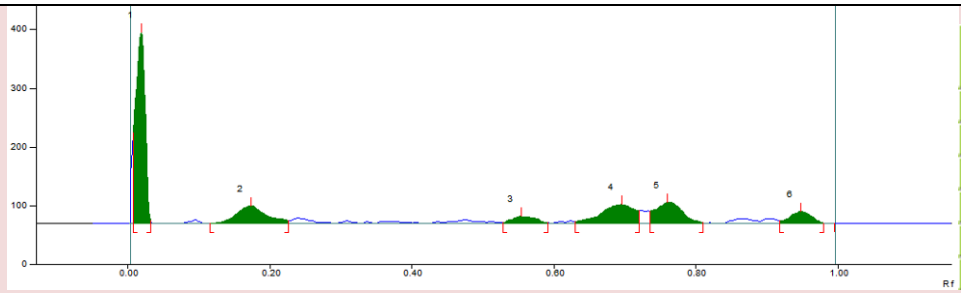
D – Dark; L –Light; F – Fluorescent

Table 4. R_f values of ingredients and *Panchavalkala Kvatha Curna* under white light after derivatisation

Nyagrodha	Udumbara	Asvattha	Parisa	Plaksa	PKC
0.06 L Violet	0.06 L Violet	0.06 L Violet	0.06 L Violet	0.06 L Violet	0.06 Violet
0.14 L Brown	-	-	-	-	-
-	-	0.16 L Brown	-	-	-
0.22 L Brown	-	0.22 L Brown	-	0.22 L Brown	-
-	0.25 L Brown	-	-	-	-
0.35 L Violet	0.35 L Violet	0.35 L Violet	0.35 L Violet	0.35 L Violet	0.35 Violet
0.42 L Violet	-	0.42 L Violet	0.42 L Brown	-	-
0.81 Violet	0.81 Violet	0.81 Violet	-	0.81 L Violet	0.81 Violet
-	-	-	0.83 L Brown	-	-
0.90 Violet	0.90 Violet	0.90 Violet	-	0.90 L Violet	0.90 Violet
-	-	-	0.95 L Brown	-	-
0.99 D Violet	0.99 D Violet	0.99 D Violet	-	0.99 D Violet	0.99 Violet

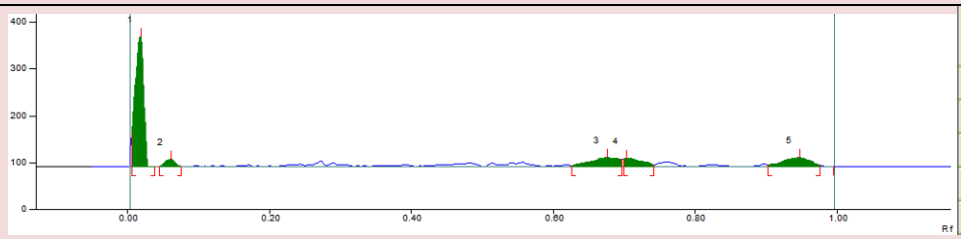
D – Dark; L –Light

Figure 2. Densitometric scan of ingredients and *Panchavalkala Kvatha* at 254 nm



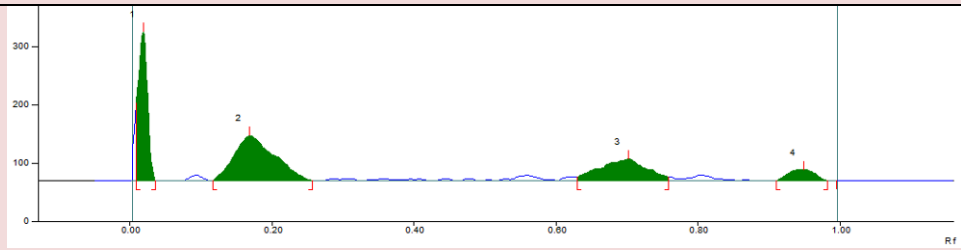
Peak	Max Position	Area %
1	0.02 Rf	46.33 %
2	0.17 Rf	13.03 %
3	0.55 Rf	4.24 %
4	0.70 Rf	15.89 %
5	0.76 Rf	14.06 %
6	0.95 Rf	6.45 %

2.1 Nyagrodha



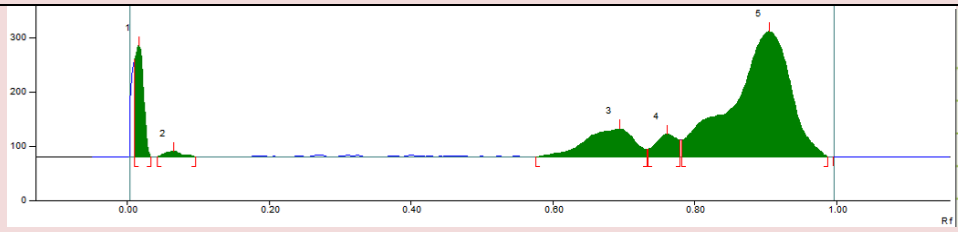
Peak	Max Position	Area %
1	0.02 Rf	59.85 %
2	0.06 Rf	3.91 %
3	0.68 Rf	14.11 %
4	0.70 Rf	8.59 %
5	0.95 Rf	13.54 %

2.2 Udumbara



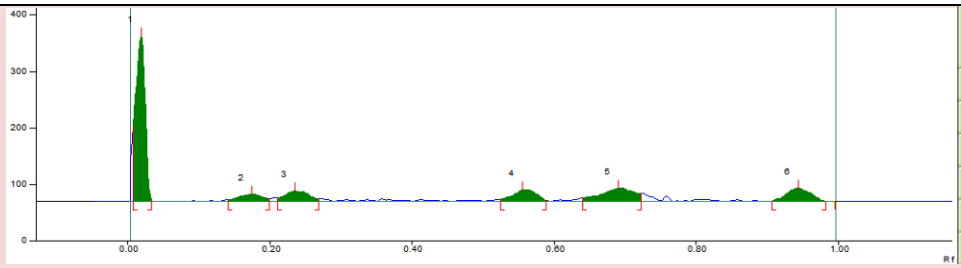
Peak	Max Position	Area %
1	0.02 Rf	30.93 %
2	0.17 Rf	40.01 %
3	0.70 Rf	22.54 %
4	0.95 Rf	6.53 %

2.3 Asvattha



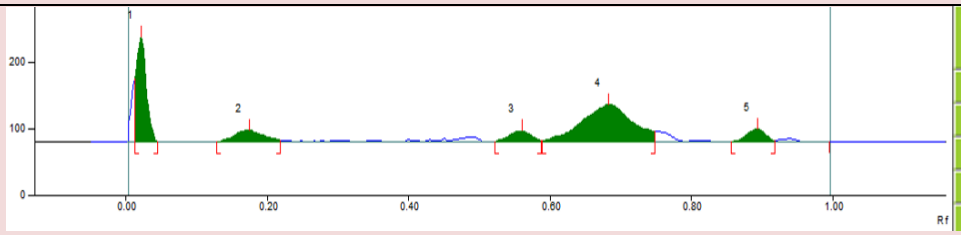
Peak	Start Height	Area %
1	177.9 AU	9.46 %
2	0.3 AU	1.00 %
3	0.3 AU	13.68 %
4	13.9 AU	4.90 %
5	31.2 AU	70.96 %

2.4 Parisa



Peak	Max Position	Area %
1	0.02 Rf	52.49 %
2	0.18 Rf	5.45 %
3	0.24 Rf	8.18 %
4	0.56 Rf	9.01 %
5	0.69 Rf	14.50 %
6	0.95 Rf	10.36 %

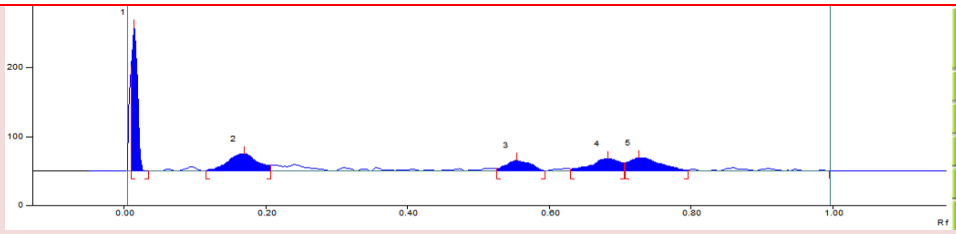
2.5 Plaksa



Peak	Max Position	Area %
1	0.02 Rf	28.65 %
2	0.18 Rf	8.94 %
3	0.56 Rf	6.38 %
4	0.68 Rf	49.67 %
5	0.90 Rf	6.35 %

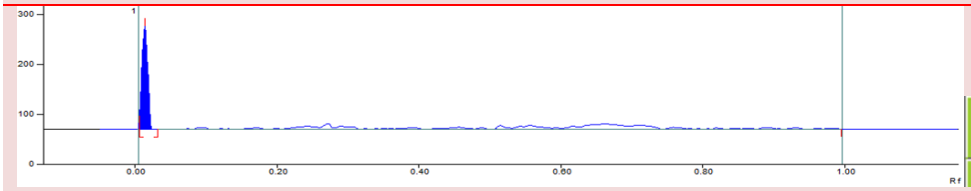
2.6 Panchavalkala Kvatha Curna

Figure 3. Densitometric scan of ingredients and *Panchavalkala Kvatha* at 366 nm



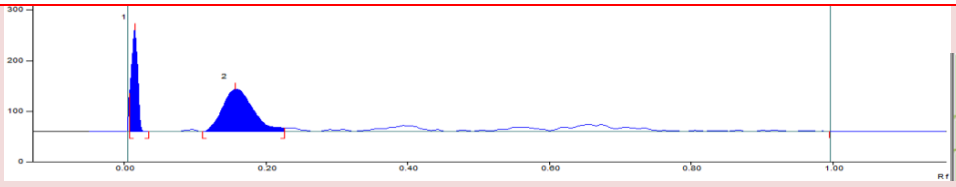
Peak	Max Position	Area %
1	0.01 R	34.91 %
2	0.17 R	21.72 %
3	0.55 R	10.88 %
4	0.68 R	14.81 %
5	0.73 R	17.67 %

3.1 Nyagrodha



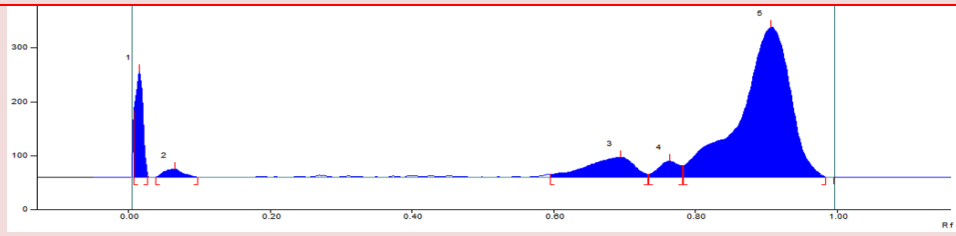
Peak	Max Position	Area %
1	0.01 Rf	100.00 %

3.2 Udumbara



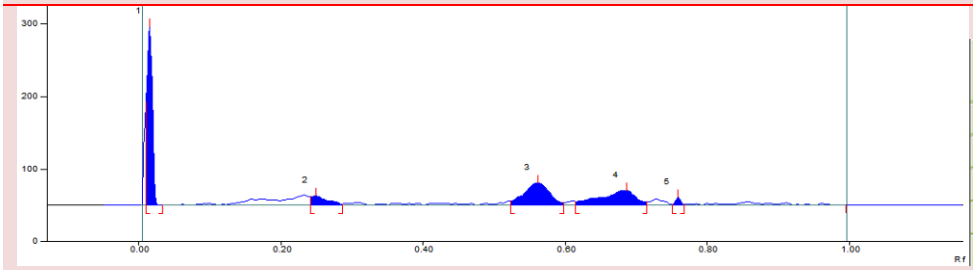
Peak	Max Position	Area %
1	0.02 R	32.72 %
2	0.16 R	67.28 %

3.3 Asvattha



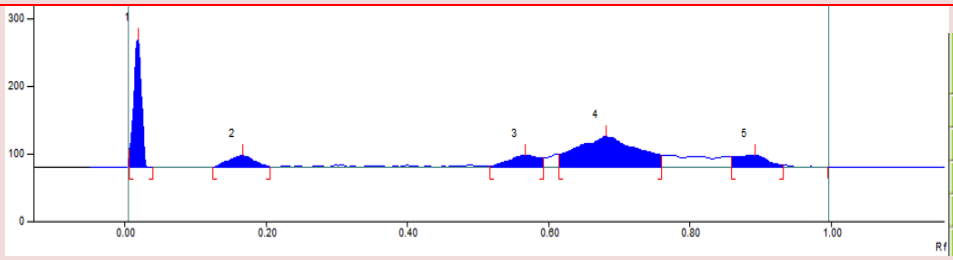
Peak	Max Position	Area %
1	0.02 Rf	8.62 %
2	0.07 Rf	1.59 %
3	0.70 Rf	9.76 %
4	0.76 Rf	3.40 %
5	0.91 Rf	76.63 %

3.4 Parisa



Peak	Max Position	Area %
1	0.02 Rf	43.50 %
2	0.25 Rf	7.00 %
3	0.56 Rf	25.15 %
4	0.69 Rf	22.54 %
5	0.76 Rf	1.82 %

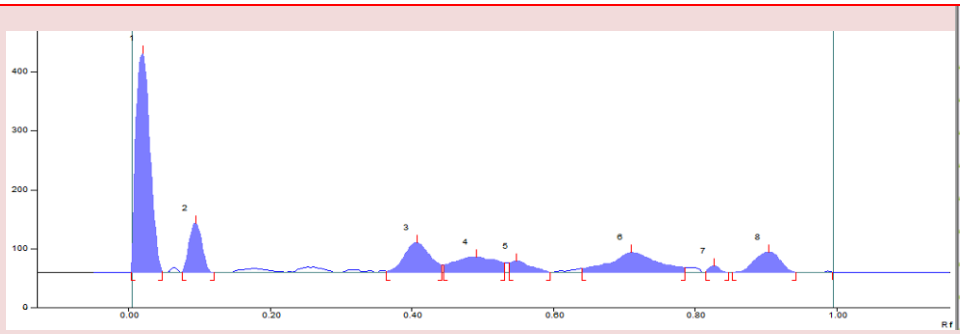
3.5 Plaksa



Peak	Max Position	Area %
1	0.02 Rf	25.54 %
2	0.17 Rf	7.67 %
3	0.57 Rf	9.54 %
4	0.68 Rf	47.30 %
5	0.89 Rf	9.95 %

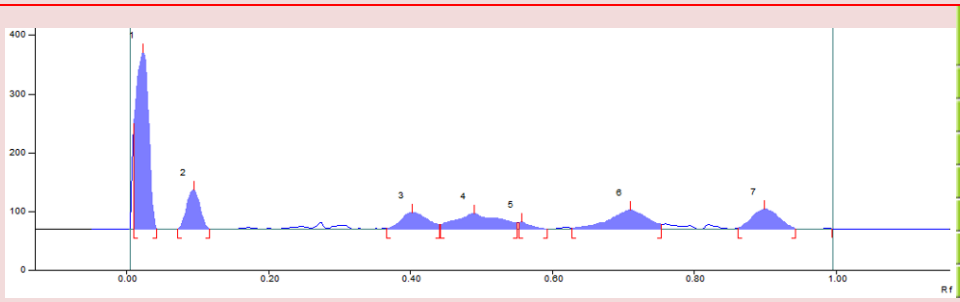
3.6 Panchavalkala Kvatha Curna

Figure 4. Densitometric scan of ingredients and *Panchavalkala Kvatha* at 620 nm after derivatisation (10 µl)



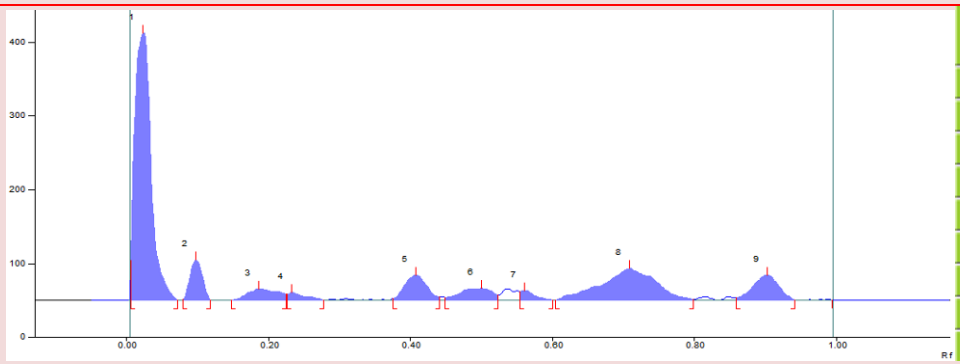
Peak	Max Position	Area %
1	0.02 Rf	44.42 %
2	0.10 Rf	9.01 %
3	0.41 Rf	11.13 %
4	0.49 Rf	9.67 %
5	0.55 Rf	3.39 %
6	0.71 Rf	13.92 %
7	0.83 Rf	0.97 %
8	0.90 Rf	7.48 %

4.1 Nyagrodha



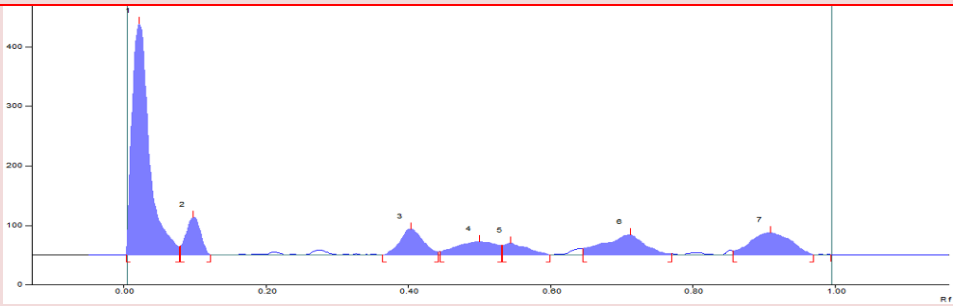
Peak	Max Position	Area %
1	0.02 Rf	42.81 %
2	0.10 Rf	9.93 %
3	0.40 Rf	8.35 %
4	0.49 Rf	13.11 %
5	0.56 Rf	1.63 %
6	0.71 Rf	13.88 %
7	0.90 Rf	10.29 %

4.2 Udumbara



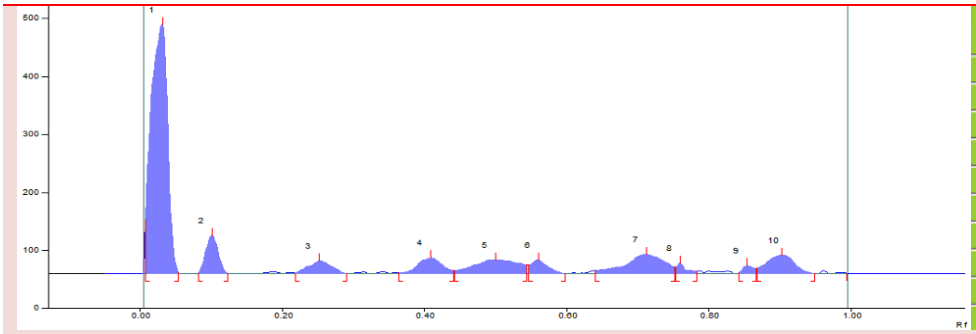
Peak	Max Position	Area %
1	0.02 Rf	49.98 %
2	0.10 Rf	5.64 %
3	0.19 Rf	3.90 %
4	0.23 Rf	1.48 %
5	0.41 Rf	6.30 %
6	0.50 Rf	4.41 %
7	0.56 Rf	1.62 %
8	0.71 Rf	19.33 %
9	0.90 Rf	7.35 %

4.3 Asvattha



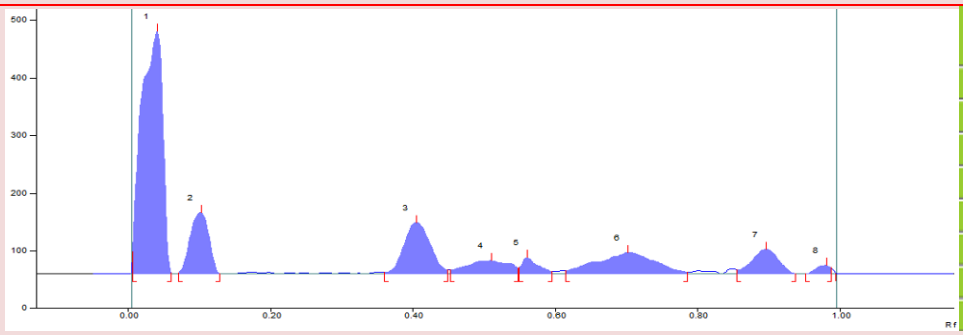
Peak	Max Position	Area %
1	0.02 Rf	52.06 %
2	0.10 Rf	7.05 %
3	0.40 Rf	7.78 %
4	0.50 Rf	7.05 %
5	0.55 Rf	3.57 %
6	0.71 Rf	10.72 %
7	0.91 Rf	11.76 %

4.4 Parisa



Peak	Max Position	Area %
1	0.03 Rf	54.93 %
2	0.10 Rf	6.18 %
3	0.25 Rf	3.83 %
4	0.41 Rf	5.00 %
5	0.50 Rf	8.20 %
6	0.56 Rf	3.01 %
7	0.71 Rf	9.77 %
8	0.76 Rf	1.32 %
9	0.85 Rf	1.11 %
10	0.90 Rf	6.66 %

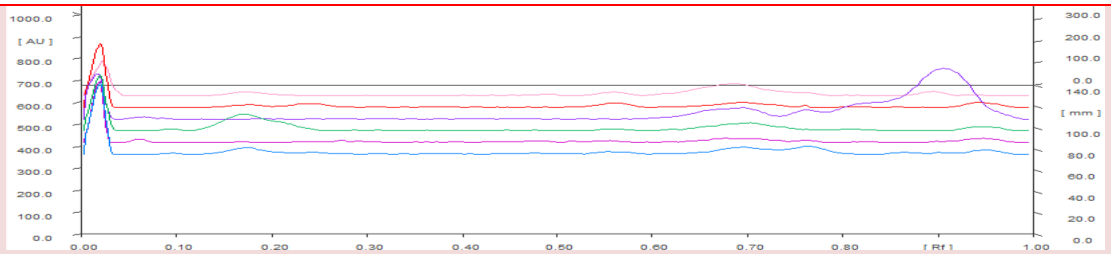
4.5 Plaksa



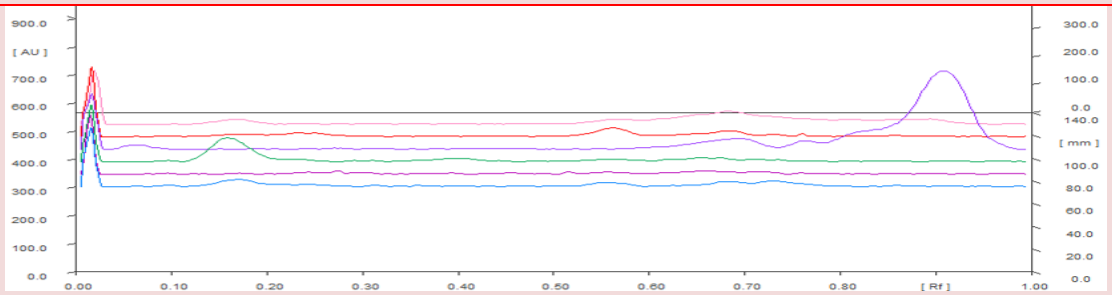
Peak	Max Position	Area %
1	0.04 Rf	49.34 %
2	0.10 Rf	10.92 %
3	0.41 Rf	12.84 %
4	0.51 Rf	5.41 %
5	0.56 Rf	2.50 %
6	0.70 Rf	11.72 %
7	0.90 Rf	6.16 %
8	0.98 Rf	1.11 %

4.6 Panchavalkala Kvatha Curna

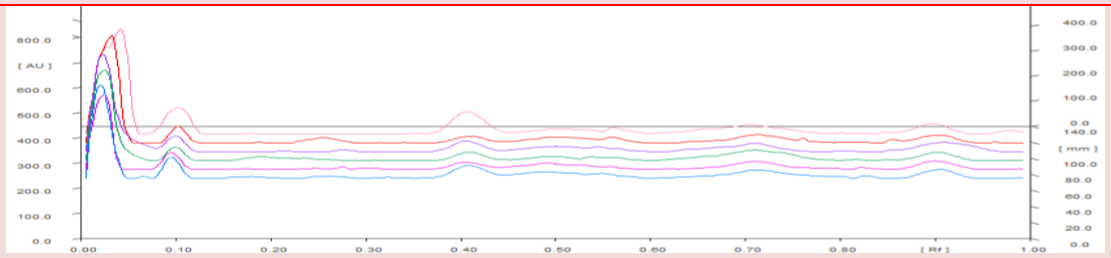
Figure 5. 3D display of ingredients and *Panchavalkala Kvatha*



5.1 At 254 nm

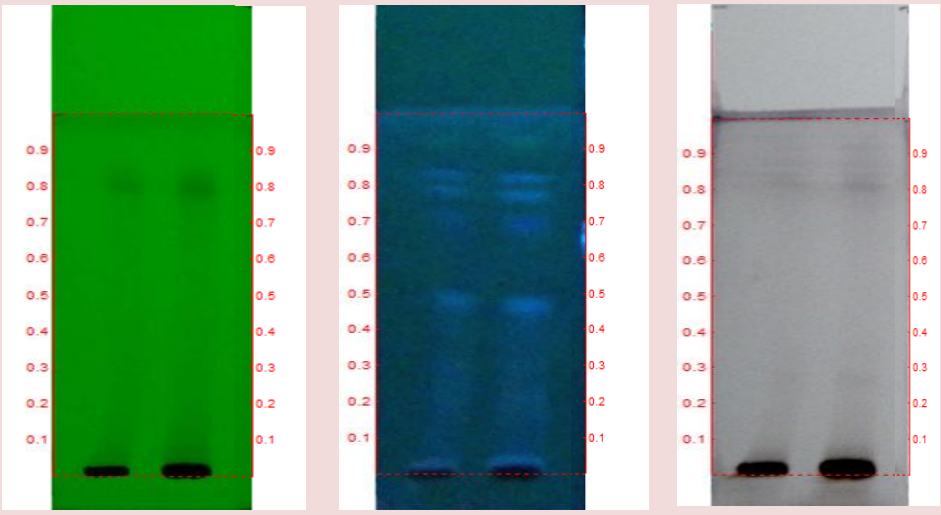


5.2 At 366 nm



5.3 At 620 nm after derivatisation

Figure 6. HPTLC photo documentation of hydro-alcoholic extract of *Panchavalkadi Kwatha Curna*



At 254 nm | At 366 nm | After Derivatisation

Solvent system: Toluene: Ethyl Acetate: Acetic acid: Water (3:3:0.8:0.2)

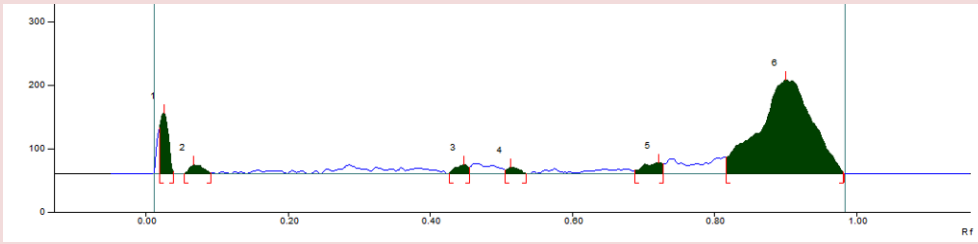
Track 1-PKC– 4 µl; Track 2– PKC– 8 µl

Table 5. R_f values of hydro-alcoholic extract of *Panchavalkadi Kwatha Curna*

Under short UV	Under long UV	Under white light after derivatisation
-	0.05 F L Violet	-
0.07 L Green)	-	0.07 L Violet
-	0.15 F L Violet	-
-	0.21 F L Violet	-
-	-	0.27 L Violet
-	0.30 F L Violet	-
-	0.34 F L Violet	-
-	0.48 F Violet	-
0.67 L Green	-	-
-	0.69 F L Violet	-
0.71 L Green	0.71 F L Violet	-
-	0.77 F L Violet	-
0.80 L Green	-	-
-	-	0.82 L Violet
-	0.84 F L Violet	0.84 L Violet
-	-	0.87 L Violet
-	0.93 F L Green	0.93 L Violet

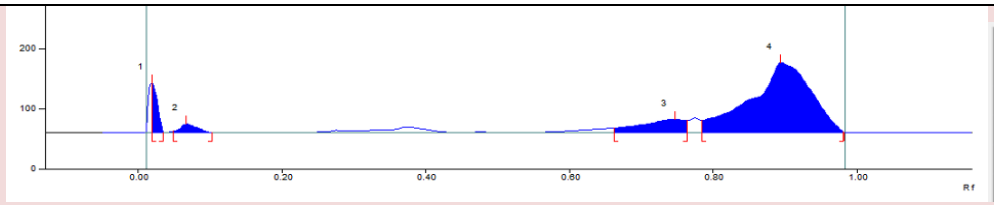
L-Light, F-Fluorescence

Figure 7. Densitometric scan of hydro-alcoholic extract of *Panchavalkadi Kwatha Curna*



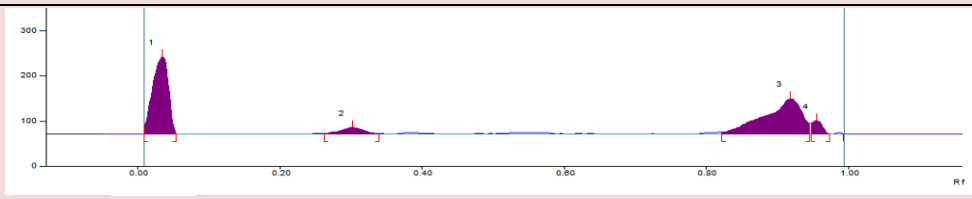
Peak	Max Position	Area %
1	0.03 Rf	8.63 %
2	0.07 Rf	2.00 %
3	0.45 Rf	1.97 %
4	0.51 Rf	1.36 %
5	0.72 Rf	3.50 %
6	0.90 Rf	82.53 %

7.1 At 254 nm



Peak	Max Position	Area %
1	0.02 Rf	5.94 %
2	0.07 Rf	2.65 %
3	0.75 Rf	11.25 %
4	0.90 Rf	80.16 %

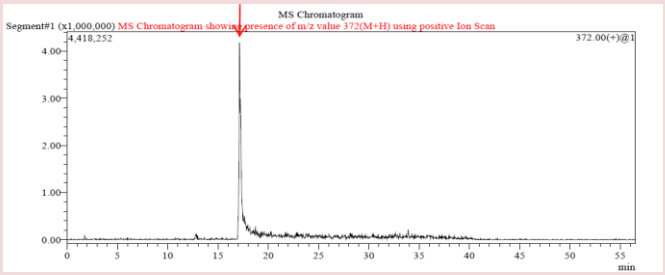
7.2 At 366 nm



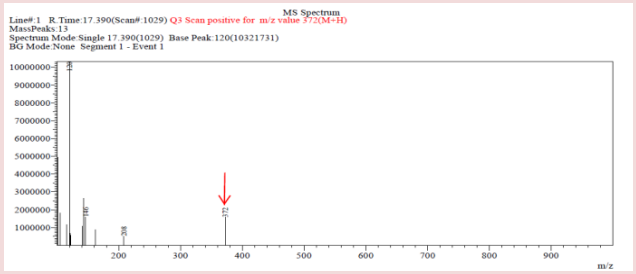
Peak	Max Height	Area %
1	171.3 AU	42.98 %
2	14.6 AU	5.48 %
3	78.6 AU	46.36 %
4	30.4 AU	5.18 %

7.3 At 620 nm after Derivatisation

Figure 8. LCMS Fingerprint of methanolic extracts of ingredients of *Panchavalakala kvatha curna*

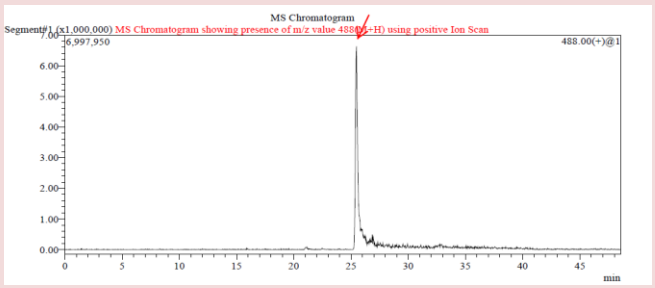


Chromatogram

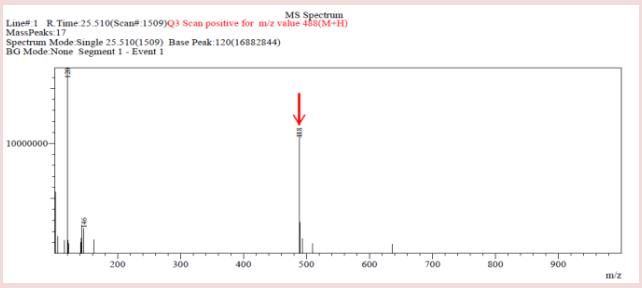


Mass spectrum

8.1 *Nyagrodha*

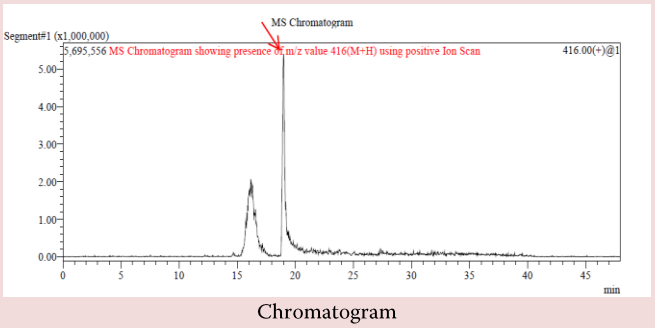


Chromatogram

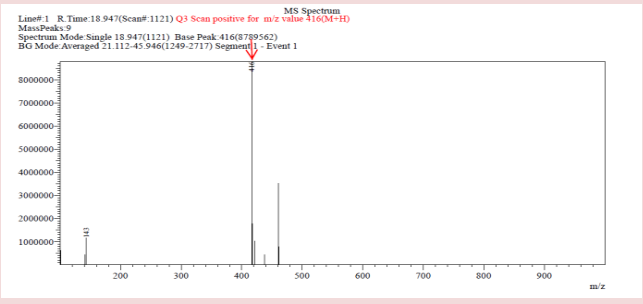


Mass spectrum

8.2 *Udumbara*

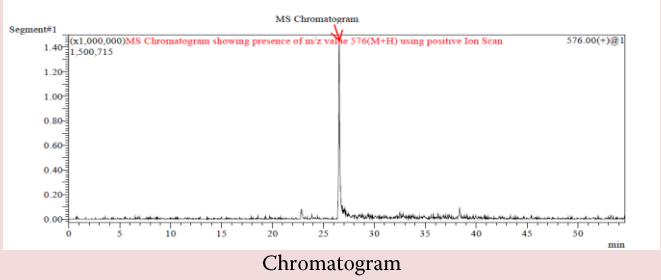


Chromatogram

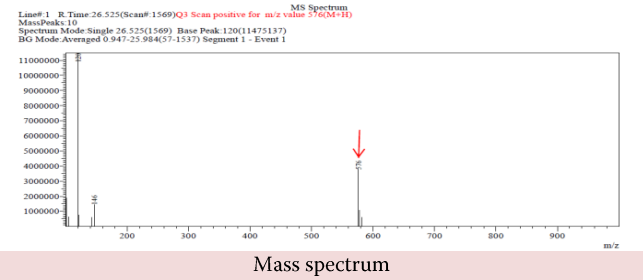


Mass spectrum

8.3 *Ashwattha*

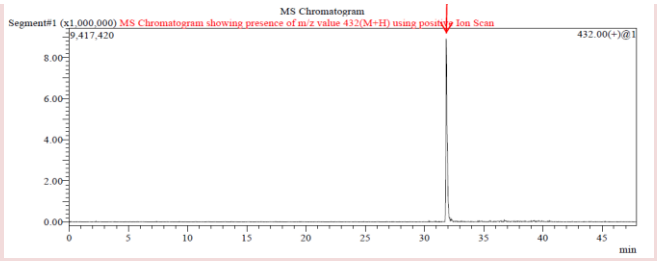


Chromatogram

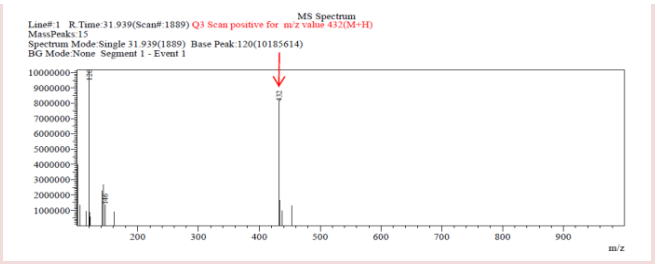


Mass spectrum

8.4 *Parisa*



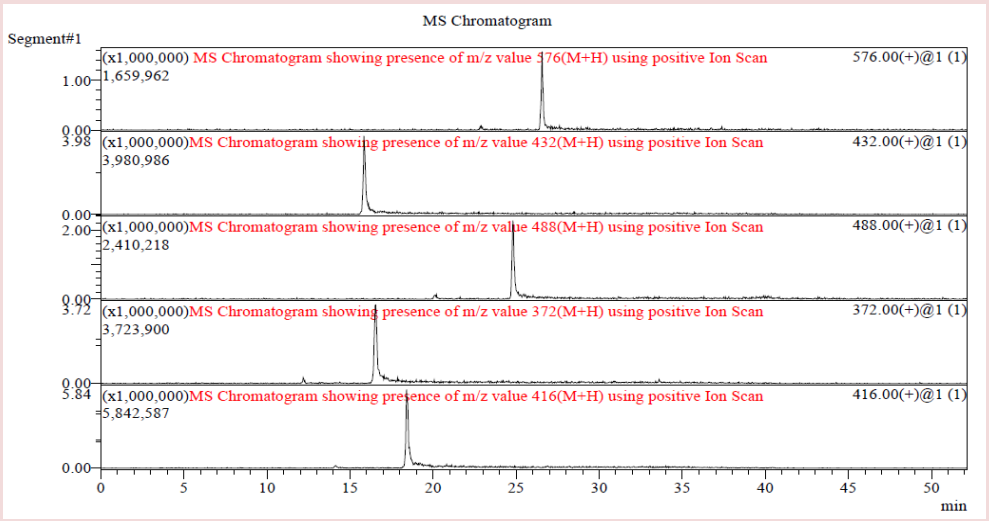
Chromatogram



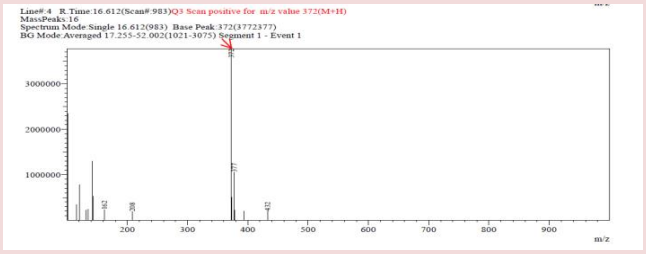
Mass spectrum

8.5 *Plaksha*

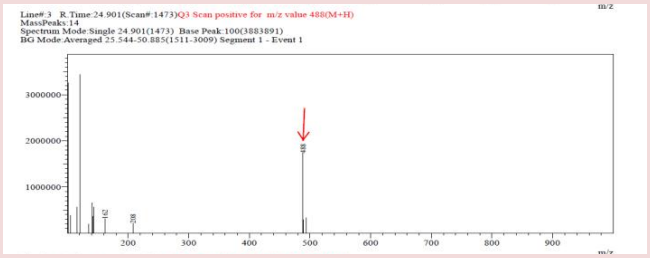
Figure 9. LCMS Fingerprint of methanolic extract of *Panchavalakala Kvatha Curna*showing peaks from its ingredients



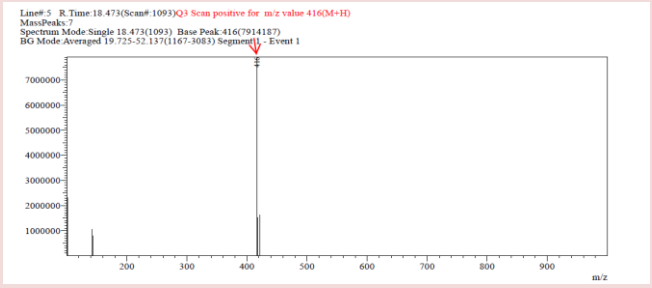
9.1 PKC



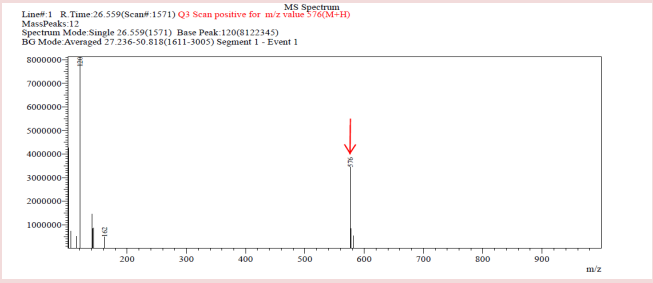
9.2 Nyagrodha



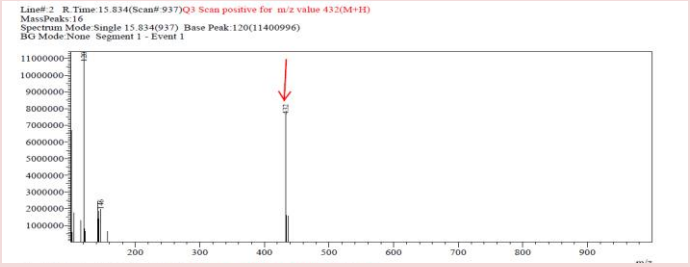
9.3 Udumbara



9.4 Ashwattha



9.5 Parisa



9.6 Plaksha

PKC has not been subjected to pharmacopoeial standards in Ayurvedic Pharmacopoeia of India so far. There is no monograph on quality standards of PKC though the formulation is very widely prescribed in Ayurvedic practice. The texture of the PKC was reported to be coarse; colour yellowish brown, with bitter taste and characteristic odour due to the specific properties of a variety of ingredients. Detailed macro-microscopic examination for identification of the ingredients and PKC will help in identifying adulterants/ substituent from the official drug along with these chemical tests[11].

The quality indicating fingerprints so obtained from the present study can be used as a monograph for standardization of PKC for academic platform and Ayurvedic drug manufacturing industry. The results obtained will serve as reference material for Pharmacopoeial works in the days to come.

4. CONCLUSION

A fact-sheet on standards for quality of Panchavalkala kvātha cūrṇa of Ayurvedic Formulary of India[12] has been proposed as below:

Definition Bhūnimbādi Kvātha Cūrṇa is a coarse powder preparation made with the ingredients as per AFI formulation composition[3] having one part each of stem bark of *Nyagrodha* (*Ficus benghalensis* L.), *Udumbara* (*Ficus racemosa* L.), *Asvattha* (*Ficus religiosa* L.), *Parisa* (*Thespesia populnea* (L.) Sol. ex Corrêa) and *Plaksha* (*Ficus lacor* Buch.-Ham.).

Method of preparation All the ingredients of Pharmacopoeial quality were washed properly. Dried raw drugs of were coarsely powdered separately. The individual powders were passed separately through sieve number 10 (1700 µm IS Sieve). Each ingredient was weighed separately and mixed together in equal proportions. Passed through sieve number 10 to obtain a homogenous blend. Packed it air-tight container and stored away from direct sunlight.

Characteristics and preservation Kvātha Cūrṇa retains potency for two year and should be kept in an air tight container. Kvātha Cūrṇa can be used for preparing Kaṣāya, Hima, Phāṇṭa, etc[3].

Physico-chemical Parameters Loss on drying at 105°C - Not more than 7.68 %; Total ash - Not more than 9.83 %; Acid-insoluble ash - Not more than 0.60 %; Alcohol -soluble extractive - Not less than 15.95 %; Water - soluble extractive - Not less than 7.44 %; pH (10% aqueous solution) - Not more than 6.00.

Thin Layer Chromatography

Ethanolic extract (Toluene: Ethyl Acetate: Formic Acid (5:5:0.2): Under short UV 3 bands at R_f 0.64, 0.84 and 0.95 (light green); under long UV 9 bands with R_f 0.08 (florescent light blue), 0.14 and 0.28 (fluorescent blue), 0.36, (fluorescent aqua), 0.54 (fluorescent blue), 0.66 (fluorescent light blue), 0.78 (fluorescent blue), 0.90 (fluorescent aqua) and 0.98 (fluorescent red); and after derivatisation with vanillin-sulphuric acid 7 bands with R_f 0.06, 0.35, 0.8, 0.90 and 0.99 (violet).

Hydro-alcoholic extract (Toluene: Ethyl Acetate: Acetic acid: Water (3:3:0.8:0.2): Under short UV showed 4 bands at R_f 0.7, 0.67, 0.71 and 0.80 (light green); under long UV showed 11 bands at R_f 0.05, 0.15, 0.21, 0.30, 0.34, 0.48, 0.69, 0.71, 0.77, 0.84 and 0.93 (fluorescent light violet); and after derivatisation with vanillin-sulphuric acid and observation under white light 6 bands at R_f 0.07, 0.27, 0.82, 0.84, 0.87, 0.93 (light violet) respectively.

Important therapeutic uses Inflammation due to wound, erysepales, syphilis/soft chancre, irrigation of wound/ulcer, leucorrhoea, conjunctivitis[12].

Dose 48 g twice a day in divided dose[3].

Sahapana For external application after grinding with ghee or as decoction for external use[3].

ACKNOWLEDGEMENT This research was done under major research project entitled "Standard Operating Procedures (SOPs) and Quality standards for four classical Kvātha Cūrṇas (Ayurvedic polyherbal coarse powders)" (No. RGU:R&D:Res.Wing:2014-15 dtd. 13 MAR 2015) sanctioned by Rajiv Gandhi University of Health Sciences, Bangalore. Authors are grateful to Dr. D. Veerendra Heggade, President, SDME Society, Ujire for the support. Guidance from Dr. R. Muralidhar, Senior Manager, SDM Ayurveda Pharmacy is duly acknowledged.

CONFLICT OF INTEREST Nil

CONTRIBUTORS Dr. KN Sunil Kumar (Principal investigator) contributed to the conceptualization of the topic, manuscript review, analysis, design of the paper. Mr. Puneeth obtained the data by performing the experiments. Mrs. Suchitra contributed to drafting of the paper. Dr. Muralidhar

(took over as principal investigator due to transfer of Dr KN Sunil Kumar) contributed to the conceptualization of the topic and contributed to the manuscript review, analysis, design and literature study.

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