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PHARMACEUTICO-ANALYTICAL STUDY OF KARPASASTHYADI TAILA – A HERBAL OIL USED FOR NASYAKARMA AND GREEVABASTI

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ABSTRACT

TailaKalpanas are the unique formulations of Ayurveda treatment which are prepared by using oil as base. *Tailas* are the integral part of *Panchakarma* which are useful in multiple ways that can be administered in different stages of *Panchakarma* practice. *Tailas* are useful for both *Bahya* and *Abhyantara*Chikitsa. The indications of *Taila yoga* in different diseases is based on the nature of different ingredients and the processing of the *Taila* with different *Paka* required for its administration through different modes such as *Pana, Basti, Nasya* & *Abhyanga. KarpasastyadiTaila* is one such commonly employed *Taila* which is specifically indicated in the treatment of *VataVyadhi* and it is indicated in different modes of administration such as *NasyaKarma, Abhyanga* and *Pana.* Keeping the above facts in mind, a comparative clinical study was undertaken to evaluate the therapeutic efficacy of *Nasya Karma* and *GreevaBasti* with *KarpasasthyadiTaila* in Cervical Spondylosis wherein *MruduPakitaKarpasasthyadiTaila* was used for *Nasya Karma*, *MadhyamaPakitaKarpasasthyadiTaila* was used for *GreevaBasti* and *KharaPakitaKarpasasthyadiTaila* was used for *MukhaAbhyanga*as a *Purvakarma* in *NasyaKarma*. The current study was undertaken to analyse and standardise the *KarpasasthyadiTaila* of different *Paka* used for *NasyaKarma, GreevaBasti* and *MukhaAbhyanga*by adopting standard testing protocol for AYUSH drugs such as Refractive Index, Specific Gravity, Acid Value, Saponification Value, Iodine Value, Unsaponified matter, HPTLC Photodocumentation, Rf Values and Densitometric Scan.

Keywords: *KarpasathyadiTaila, NasyaKarma, GreevaBasti, MukhaAbhyanga, TailaPaka,*

INTRODUCTION

Cervical Spondylosis is a degenerative condition of the cervical spine & its treatment should be viewed from the point of *VataVyadhi*. *Panchakarma*, the inherent & integral part of *Ayurveda* is contributing a lot in the management of different degenerative conditions which includes both *Bahya* and *Antah-ParimarjanaChikitsa.* In order to counteract this condition, two distinct modalities of treatment are employed viz. *NasyaKarma*, as a*Antah-ParimarjanaChikitsa* and *Greeva-Basti*, as a *Bahi-ParimarjanaChikitsa*. *Snehana* is the first and foremost treatment modality in degenerative disorders. In classics, the therapeutic utility of *Sneha* is described on the basis of three types of *Snehapaka*[1] namely *Mrudu, Madhyama* and *Kharapaka* which are indicated for *NasyaKarma, SarvaKarma* and *Abhyanga* purposes respectively. These different *Paka* highlights the importance of pharmaceutical aspect of the formulation. Among *Sneha, Taila* is considered as the best in treating *VataVyadhi* and it imparts the *snehana* effect through different possible routes. *KarpasasthyadiTaila*[2, 3] is one such formulation which is prepared by using *Karpasasthi, Bala, Masha, Kulattha, Ajaksheera, TilaTaila* and many other *prakshepadravyas*and can be used for *NasyaKarma, Abhyanga* and *Pana.* It is indicated in *SarvaVatarogas* especially in *Apabahuka*, *Pakshaghata* and *Ardita* as its mode of action is *SarvaAnilapaha*. In this regard, a comparative clinical study was undertaken to evaluate the therapeutic efficacy of *Nasya Karma* and *GreevaBasti* with *KarpasasthyadiTaila* in Cervical Spondylosis wherein *MruduPakitaKarpasasthyadiTaila* was used for *Nasya Karma*, *MadhyamaPakitaKarpasasthyadiTaila* was used for *Greeva-Basti* and *KharaPakitaKarpasasthyadiTaila* was used for *MukhaAbhyanga* as a *Purvakarma* in *NasyaKarma*. The current study was undertaken to analyse and standardise the *KarpasasthyadiTaila* of different *Paka* used for *NasyaKarma, GreevaBasti* and *MukhaAbhyanga* by adopting standard testing protocol such as Refractive Index, Specific Gravity, Acid Value, Saponification Value, Iodine Value, Unsaponified matter, HPTLC Photodocumentation, Rf Values and Densitometric Scan.

MATERIALS AND METHODS

Materials required for the preparation of *KarpasasthyadiTaila* were collected from SDM Ayurveda Pharmacy, Udupi. *KarpasasthyadiTaila* of *MriduPaka*, *MadhyamaPaka* and *KharaPaka* was prepared as per *TailaPakaVidhi* in S.D.M. Ayurveda Pharmacy, Kuthpady, Udupi, Karnataka. The ingredients, part used, quantity and method of preparation of *KarpasasthyadiTaila* was followed as per the reference of *Sahasra Yoga* and Ayurvedic Formulary of India (AFI) Part-1. The process of *TailaPaka* and the assessment of its *TrividhaPaka* were done as per the reference of *SharangadharaSamhita, MadhyamaKhanda*, 9th *Adhyaya*. Analytical studies were conducted in SDM Centre for Research in Ayurveda and Allied sciences, Kuthpady, Udupi, Karnataka, India.

Preparation of *KarpasasthyadiTaila*

TABLE 1: Showing the Method of Preparation of *KarpasasthyadiTaila*& its Uses

Drava Dravya	*Kashaya*: The ingredients 1 to 4 (as mentioned in table below) i.e., *Karpasasthi, Bala, Masha* and *Kulattha* were boiled in 1 *Drona* (12.288 litres) of water under mild fire and reduced to 1/4th i.e., 3.072 litres and filtered.
	AjaKsheera (Goat's Milk) – 768 ml
Kalka Dravya	Equal quantity (16 grams each) of drugs 06 to 16 (as mentioned in table below) were powdered and mixed with water to get it in *Kalka* form.
SnehaDravya	1 *Prastha* (768 gms) of *TilaTaila*.
Procedure	*Kwatha, Kalka* and *Taila* were boiled together under mild fire. While boiling the above mixture, *AjaKsheera* was added at regular intervals as and when the volume of the mixture reduces. *TailaPakaKriya* was continued under the mild fire to obtain *MruduPakitaKarpasasthyadiTaila* which was used for *Nasya Karma*. After collecting the required quantity of *MruduPakitaTaila*, heating under mild fire was further continued to obtain *MadhyamaPakitaKarpasasthyadiTaila* which was used for *GreevaBasti.* After collecting the required quantity of*MadhyamaPakitaTaila*, further heating under mild fire was continued to obtain *KharaPakitaTaila* which was used for *Mukhabhyanga* as a *Purvakarma* in *Nasya Karma.*
Mode of Use	*Pana*, *Navana* and *Abhyanga*
Action	*Sarvaanilaapaham*
Indication	*SarvaVataRoga*
Special Indications	*Apabahuka*
	Pakshaghata
	Ardita

All the ingredients were added approximately 80 times to that of the quantity mentioned in AFI with the intention to prepare drug in bulk around 40 litres. After the completion of *Paka*, it was packed in separate bottles as per the requirement. The *MruduPakitaKarpasasthyadiTaila* was packed in 5ml bottles fitted with dropper which was used for the purpose of *NasyaKarma*. The *MadhyamaPakitaKarpasasthyadiTaila* was packed in 500ml bottles which were used for the purpose of *GreevaBasti*. In the last, *KharaPakitaKarpasasthyadiTaila* was bottled in 100ml bottles which were used for the purpose of *MukhaAbhyanga* as a *Purvkarma* of *Nasya Karma*.

TABLE 2: Showing the Quantity of Ingredients of *KarpasasthyadiTaila*

Sl. No.	Drug	Quantity (AFI)	for 40 litres	Quantity required for 40 litres

01.	*Karpasasthi*	768 grams	768 x 80	61.44 kg
02.	*Bala*	768 grams	768 x 80	61.44 kg
03.	*Masha*	768 grams	768 x 80	61.44 kg
04.	*Kulattha*	768 grams	768 x 80	61.44 kg
05.	Water for decoction	12.288 litres	12.288 x 80	983.04 litres
	Reduced to	3.072 litres	3.072 x 80	245.76 litres
06.	*Devadaru*	16 grams	16 x 80	1.28 kg
07.	*Bala*	16 grams	16 x 80	1.28 kg
08.	*Rasna*	16 grams	16 x 80	1.28 kg
09.	*Kushta*	16 grams	16 x 80	1.28 kg
10.	*Sarshapa*	16 grams	16 x 80	1.28 kg
11.	*Nagara*	16 grams	16 x 80	1.28 kg
12.	*Shatahwa*	16 grams	16 x 80	1.28 kg
13.	*Pippalimula*	16 grams	16 x 80	1.28 kg
14.	*Chavya*	16 grams	16 x 80	1.28 kg
15.	*Shigru*	16 grams	16 x 80	1.28 kg
16.	*Punarnava*	16 grams	16 x 80	1.28 kg
17.	*Taila (TilaTaila)*	768 grams	768 x 80	61.44 kg
18.	*AjaKsheera*	768 ml	768 x 80	61.44 litres

ANALYTICAL STUDY OF *KARPASASTHYADI TAILA*

Three separate samples packed in three different bottles containing 5ml bottled *MriduPakitaKarpasasthyadiTaila* (*NasyaKarma* Sample), 500ml bottled *MadhyamaPakitaKarpasasthyadiTaila* (*GreevaBasti* Sample) and 100ml bottled *KharaPakitaKarpasasthyadiTaila* (*MukhaAbhyanga* Sample) were analysed for standardization using standard testing protocol at SDM Centre Research in Ayurveda and Allied Sciences, Kuthpady, Udupi. All the 3 samples were assessed for Refractive Index, Specific Gravity, Acid Value, Saponification Value, Iodine Value, Unsaponified matter, HPTLC Photodocumentation, Rf Values and Densitometric Scan.[4, 5]

METHODOLOGY

Refractive index - Placed a drop of water on the prism and adjusted the drive knob in such a way that the boundary line intersects the separatrix exactly at the centre. Noted the reading. Distilled water has a refractive index of 1.3325 at 25˚C. The difference between the reading and 1.3325 gives the error of the instrument. If the reading is less than 1.3325, the error is minus (-) then the correction is plus (+) if the reading is more, the error is plus (+) and the correction is minus (-). Refractive index of oil is determined using 1 drop of the sample. The correction if any should be applied to the measured reading to get the accurate refractive index. Refractive index of the test samples were measured at 28˚C.

Specific gravity - Cleaned a specific gravity bottle by shaking with acetone and then with

ether. Dried the bottle, noted the weight and cooled the sample solution to room Temperature. Carefully filled the specific gravity bottle with the test liquid, inserted the stopper and removed the surplus liquid. Noted the weight and repeated the procedure using distilled water in place of sample solution.

Acid value - Weighed 2 - 10g of oil in a conical flask. Added 50 ml of acid free alcohol-ether mixture (25+25ml) previously neutralised with the 0.1M potassium hydroxide solution and shaken well. Added One ml of Phenolphthalein solution and titrated against 0.1M Potassium hydroxide solution. End point is the appearance of pale pink colour. Repeated the experiment twice to get concordant values.

Saponification value - Weighed 2g of the Oil into a 250 ml RB flask fitted with a reflux condenser. Added 25ml of 0.5M alcoholic potash. Refluxed on a water bath for 30 minutes. Cooled and added 1 ml of Phenolphthalein solution and titrated immediately with 0.5 M Hydrochloric acid (a ml). Repeated the operation omitting the substance being examined (blank) (b ml). Repeated the experiment twice to get concordant values.

Iodine value - The sample was accurately weighed in a dry iodine flask. Dissolved with 10ml of CCl_4 , 20ml of iodine monochloride solution was added. Stopper was inserted, which was previously moistened with solution of potassium iodide and flask was kept in a dark place at a temperature of about 17^0 C for 30 min. 15ml of potassium iodide and 100ml of water was added and shaken well. This was titrated with 0.1N Sodium thiosulphate, starch was used as indicator. The number of ml of 0.1N sodium thiosulphate required (a) was noted. The experiment was repeated with the same quantities of reagents in the same manner omitting the substance. The number of ml of 0.1N sodium thiosulphate required (b) was noted. The experiment was repeated twice to get concordant values.

Determination of Unsaponifiable matter - Weighed 5g of the substance into the flask. Added 50ml alcoholic KOH into the sample. Boiled gently but steadly under reflux condenser for one hour. The condensor was washed with 10ml of ethyl alcohol and the mixture was collected and transferred to a separating funnel. The transfer was completed by washing the sample with ethyl alcohol and cold water. Altogether, 50ml of water was added to the separating funnel followed by an addition of 50ml petroleum ether. The stopper was inserted and shaken vigorously for 1 minute and allowed it to settle until both the layers were clear. The lower layer containing the soap solution was transferred to another separating funnel and repeated the ether extraction six times more using 50ml of petroleum ether for each extraction. All the extracts were collected in a separating funnel. The combined extracts were washed in the funnel 3 times with 25ml of aqueous alcohol and shaked vigorously. And drawing off the alcohol-water layer after each washing. The ether layer was again washed repeatedly with 25ml of water until the water no longer turns pink on addition of a few drops of Phenolphthalein indicator solution. The ether layer was transferred to a tarred flask containing few pieces of pumice stone and evaporated to dryness on a water bath. Placed the flask in an air oven at 85°c for about 1 hour to remove the last traces of ether.

A few ml of acetone was added and evaporated to dryness on a water bath. Cooled in a desicator to remove last traces of moisture and then weighed.

HPTLC:

Sample preparation for HPTLC - Sample obtained in the procedure for the determination of unsaponifiable matter is dissolved in 10 ml of chloroform this was followed for *GreevaBasti* sample (*MadhyamaPakitaTaila*) and *MukhaAbhyanga* sample (*KharaPakitaTaila).* For *NasyaKarma* sample, 10.0ml of sample was partitioned with 20.0ml of methanol, and methanol soluble portion was used for HPTLC. 3, 6 and 9µl of the above sample was applied on a precoated silica gel F254 on aluminum plates to a band width of 8 mm using Linomat 5 TLC applicator. The plate was developed in Toluene – Ethyl acetate (9:1) and the developed plates were visualized under UV 254 and 366 nm, and after derivatisation in vanillin-sulphuric acid spray reagent and scanned under UV 254 and 366 nm. R_f, colour of the spots and densitometric scan were recorded.

RESULTS

The results of Organoleptic Characteristics, Standardization Parameters, HPTLC photo-documentation, Rf values and Densitometric scan are given in respective tables and figures.

TABLE 3: Showing the Organoleptic Characteristics of *KarapasasthyadiTaila*

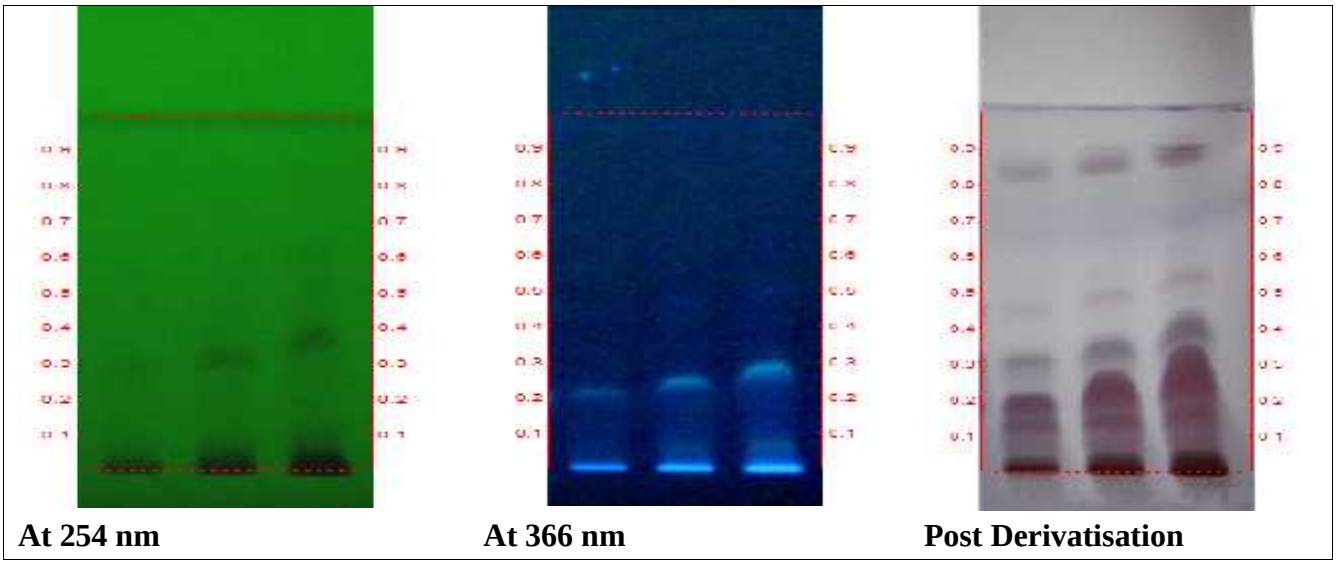
Parameter	*NasyaKarma*Sample *(Mridupakita)*	*GreevaBasti*Sample *(Madhyamapakita)*	*MukhaAbhyanga*Sample *(Kharapakita)*
Appearance	Oily Viscous	Oily Viscous	Oily Viscous
Colour	Brownish Yellow	Brownish Yellow	Brownish Yellow
Odour	Oily	Oily	Oily
Touch	Greasy	Greasy	Greasy
Clarity	Clear	Clear	Clear
Taste	Bitter	Bitter	Bitter

TABLE:4 Showing the Results of Standardization of *KarapasasthyadiTaila*

Parameter	*NasyaKarma* Sample *(Mridupakita)*	*GreevaBasti* Sample *(Madhyamapakita)*	*MukhaAbhyanga* Sample *(Kharapakita)*
Refractive Index	1.47106	1.47006	1.47156
Specific Gravity	0.9237	0.9202	0.9199
Acid Value	23.48	24.46	24.06
Saponification Value	373.63	175.05	130.69
Iodine Value	76.14	57.48	50.09
Unsaponifiable Matter	2.00	1.41	1.60

NASYAKARMA SAMPLE – MRIDUPAKITA KARPASASTHYADI TAILA:

Figure.1 Showing HPTLC photo documentation of Chloroform extract of *NasyaKarma* Sample (*MridupakitaKarpasasthyadiTaila*)



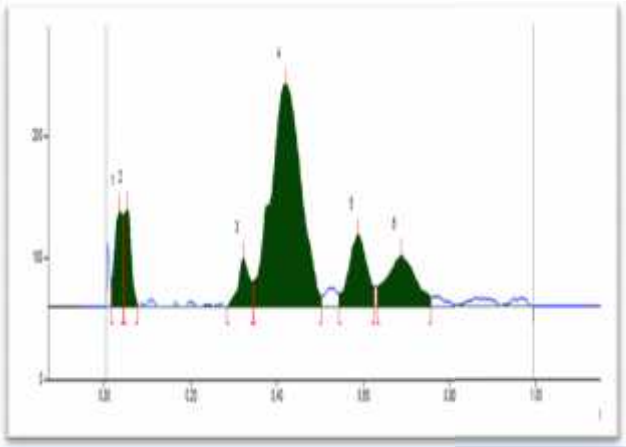
At 254 nm **At 366 nm** **Post Derivatisation**

***NasyaKarma* Sample - 3µl; *NasyaKarma* Sample - 6µl; *NasyaKarma* Sample - 9µl**
Solvent system: Toluene: Ethyl acetate (9:1)

TABLE 5: Showing the Rf Values of *Nasyakarma* Sample (*MridupakitaKarpasasthyadiTaila*)

At 254 nm	At 366 nm	Post Derivatisation
-	0.07 (FL. green)	-
-	-	0.13 (D. pink)
-	-	0.20 (D. pink)
-	0.22 (FD. blue)	-
0.30 (D. green)	-	0.30 (D. purple)
-	0.47 (FD. blue)	0.47 (L. pink)
-	-	0.84 (D. purple)

Figure 2: Showing the Densitometric Scan of *NasyaKarma* Sample (*MridupakitaKarpasasthyadi-Taila*) (At 9 µl)

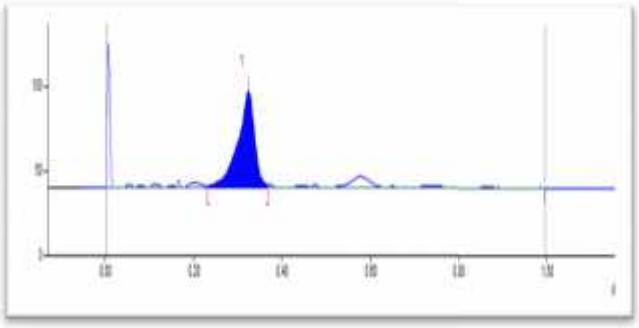


Trace 9 ID: Nasyakarma

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	21.3 AU	0.04 Rf	77.3 AU	16.12 %	0.05 Rf	75.1 AU	1065.3 AU	6.64 %
2	0.05 Rf	75.2 AU	0.05 Rf	79.8 AU	16.64 %	0.08 Rf	0.8 AU	947.3 AU	8.27 %
3	0.29 Rf	0.1 AU	0.32 Rf	39.7 AU	8.28 %	0.35 Rf	20.3 AU	735.1 AU	4.70 %
4	0.35 Rf	20.6 AU	0.42 Rf	181.6 AU	37.89 %	0.50 Rf	8.4 AU	9111.7 AU	58.42 %
5	0.55 Rf	10.2 AU	0.59 Rf	58.2 AU	12.35 %	0.65 Rf	15.8 AU	1769.8 AU	11.35 %
6	0.65 Rf	16.5 AU	0.69 Rf	41.7 AU	8.71 %	0.75 Rf	7.4 AU	1967.8 AU	12.62 %

At 254 nm

Figure 3: Showing the Densitometric Scan of *NasyaKarma*Sample (*MridupakitaKarpasast-hyadiTaila*) (At 9 µl)

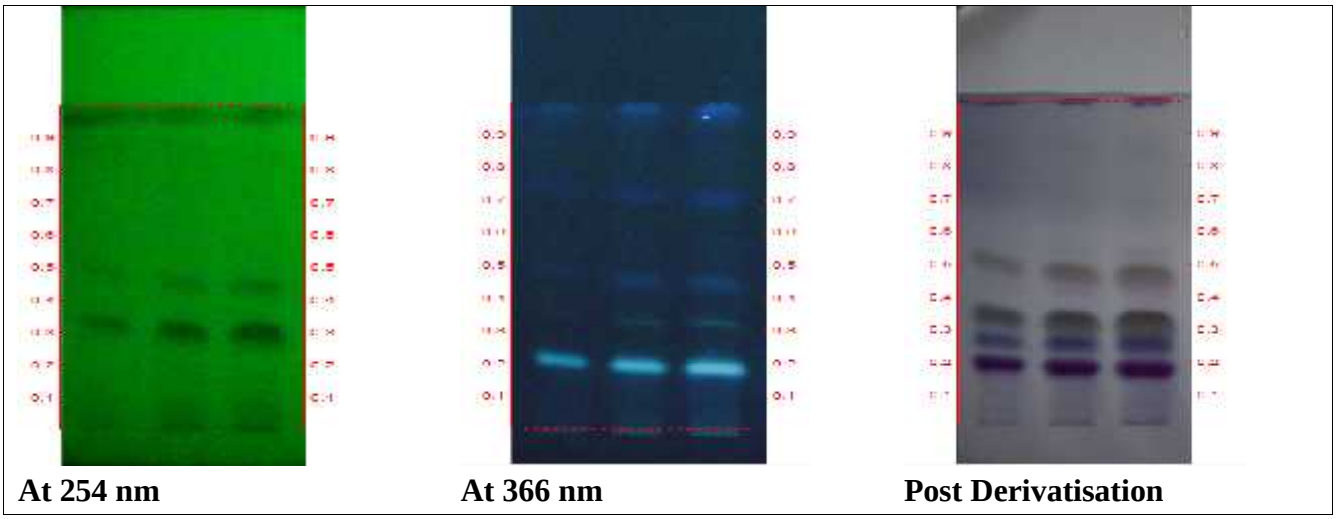


Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.23 Rf	0.8 AU	0.33 Rf	56.8 AU	100.00 %	0.37 Rf	2.7 AU	1536.3 AU	100.00 %

At 366 nm

GREEVABASTI SAMPLE – MADHYAMAPAKITA KARPASASTHYADI TAILA:

Figure 4: Showing HPTLC photo documentation of Chloroform extract of *GreevaBasti* Sample (*MadhyamapakitaKarpasasthyadiTaila*)



At 254 nm **At 366 nm** **Post Derivatisation**

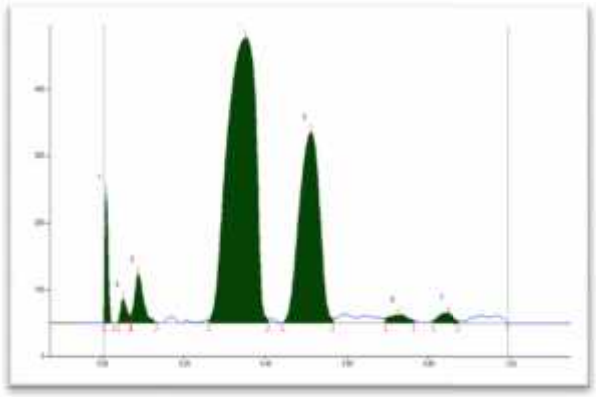
***GreevaBasti* Sample - 3µl; *GreevaBasti* Sample - 6µl; *GreevaBasti* Sample - 9µl**
Solvent system: Toluene: Ethyl acetate (9:1)

TABLE 6: Showing the Rf Values of *Greevabasti* Sample (*MadhyamapakitaKarpasasthyadiTaila*)

At 254 nm	At 366 nm	Post Derivatisation
0.08 (L. green)	-	-
-	0.19 (FL. blue)	0.19 (FD. pink)
-	-	0.26 (FD. purple)
0.31 (D. green)	-	-
-	0.33 (FL. green)	0.34 (FD. green)
0.45 (D. green)	0.45 (FL. blue)	-
-	-	0.47 (FL. green)

-	0.71 (FD. blue)	-

Figure 5: Showing the Densitometric Scan of *GreevaBasti* Sample (*MadhyamapakitaKarpasasthyadiTaila*) (At 9 µl)

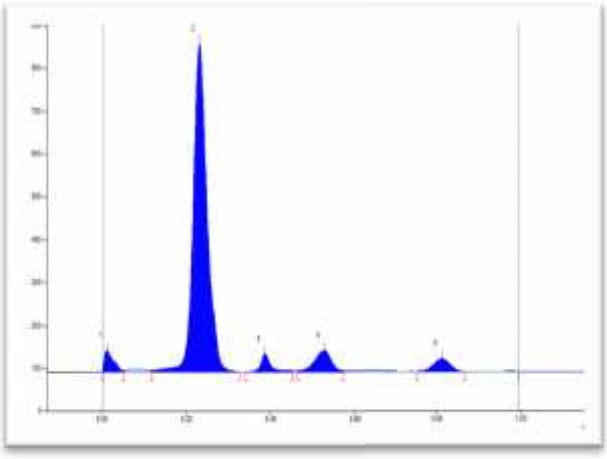


Track 3, ID: Greevabasti

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	96.0 AU	18.78 %	0.03 Rf	0.2 AU	1086.7 AU	3.11 %
2	0.04 Rf	0.2 AU	0.05 Rf	35.9 AU	3.43 %	0.07 Rf	11.1 AU	402.8 AU	1.15 %
3	0.07 Rf	12.0 AU	0.09 Rf	73.5 AU	7.03 %	0.13 Rf	0.3 AU	1143.1 AU	3.27 %
4	0.26 Rf	3.8 AU	0.35 Rf	426.2 AU	40.80 %	0.41 Rf	5.3 AU	2375.6 AU	6.11 %
5	0.44 Rf	0.1 AU	0.51 Rf	285.5 AU	27.32 %	0.57 Rf	6.3 AU	10163.1 AU	29.06 %
6	0.70 Rf	6.9 AU	0.75 Rf	12.3 AU	1.17 %	0.77 Rf	3.7 AU	405.8 AU	1.16 %
7	0.81 Rf	3.5 AU	0.85 Rf	15.4 AU	1.48 %	0.88 Rf	3.9 AU	401.4 AU	1.15 %

At 254 nm

Figure 6: Showing the Densitometric Scan of *GreevaBasti* Sample(*MadhyamapakitaKarpasasthyadiTaila*) (At 9 µl)



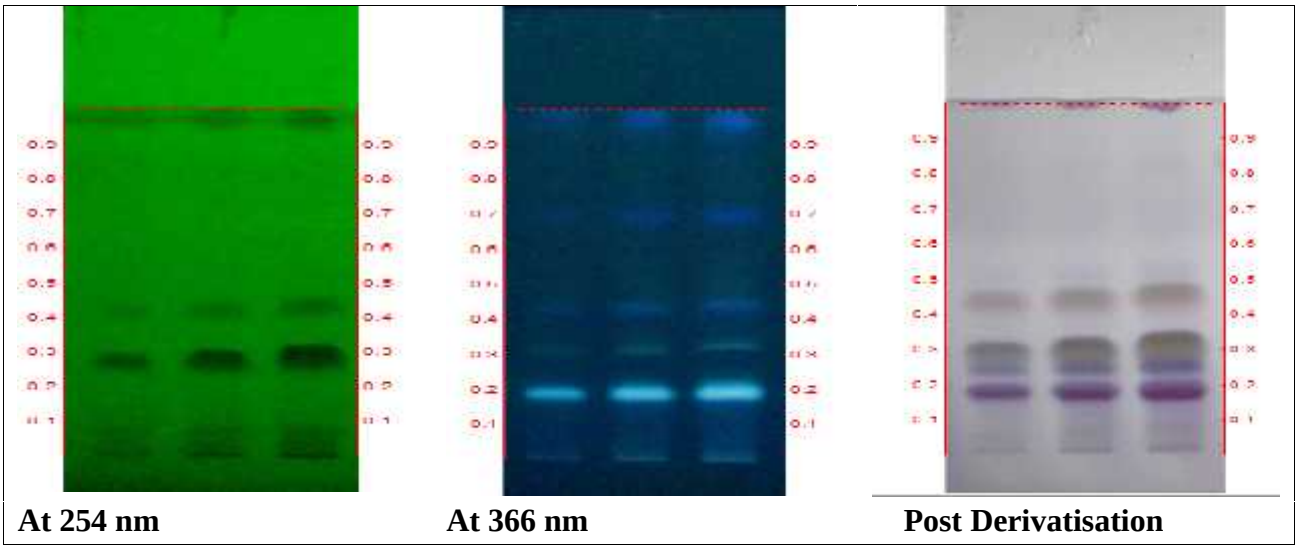
Track 3, ID: Greevabasti

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	0.0 AU	0.01 Rf	51.2 AU	5.43 %	0.05 Rf	3.1 AU	738.8 AU	3.59 %
2	0.12 Rf	3.9 AU	0.23 Rf	766.9 AU	81.35 %	0.33 Rf	0.0 AU	16961.4 AU	82.43 %
3	0.34 Rf	0.0 AU	0.39 Rf	43.3 AU	4.60 %	0.45 Rf	2.8 AU	744.4 AU	3.34 %
4	0.46 Rf	3.0 AU	0.53 Rf	50.9 AU	5.40 %	0.58 Rf	3.9 AU	1473.7 AU	6.62 %
5	0.75 Rf	0.9 AU	0.81 Rf	30.3 AU	3.22 %	0.87 Rf	0.0 AU	997.1 AU	4.03 %

At 366 nm

MUKHA ABHYANGA SAMPLE – KHARAPAKITA KARPASASTHYADI TAILA:

Figure 7: Showing HPTLC photo documentation of Chloroform extract of *MukhaAbhyanga* Sample (*KharapakitaKarpasasthyadiTaila*)

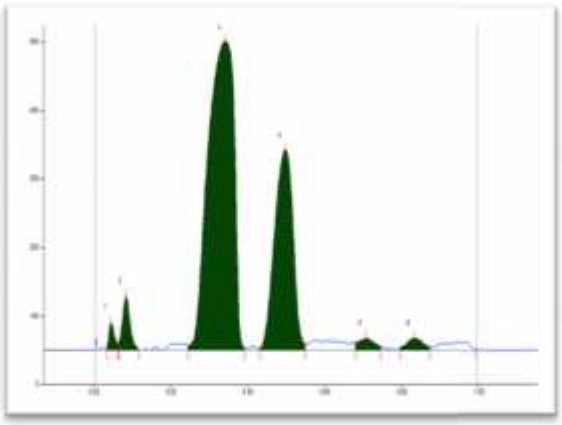


At 254 nm **At 366 nm** **Post Derivatisation**

***Mukhabhyanga* Sample-3µl; *Mukhabhyanga*Sample-6µl; *Mukhabhyanga* Sample-9µl**
Solvent system: Toluene: Ethyl acetate (9:1)

TABLE 7: Showing the Rf Values of *MukhaAbhyanga* Sample (*KharapakitaKarpasasthyadiTaila*)		
At 254 nm	At 366 nm	Post Derivatisation
-	-	0.07 (L. purple)
-	-	0.12 (L. purple)
-	0.19 (FL. blue)	0.19 (L. pink)
-	-	0.25 (D. purple)
0.29 (D. green)	-	-
-	0.32 (FD. green)	0.32 (L. green)
0.43 (L. green)	-	0.43(L. pink)
-	0.45 (FD. blue)	-
-	-	0.47 (L. green)
-	0.50 (FL. green)	-
-	-	0.53 (L. purple)
-	0.57 (FL. green)	-
-	-	0.65 (L. purple)
-	0.70 (FD. blue)	0.70 (L. purple)
-	-	0.83 (L. purple)

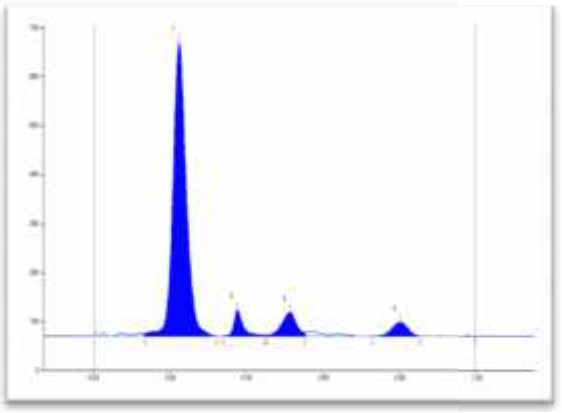
Figure 8: Showing the Densitometric Scan of *MukhaAbhyanga* Sample (*KharapakitaKarpa-sasthyadiTaila*) (At 9 µl)



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.04 Rf	2.4 AU	0.05 Rf	40.7 AU	4.53 %	0.06 Rf	0.6 AU	435.8 AU	1.24 %
2	0.07 Rf	1.4 AU	0.09 Rf	79.2 AU	8.81 %	0.12 Rf	0.3 AU	1141.3 AU	3.25 %
3	0.25 Rf	6.6 AU	0.34 Rf	451.1 AU	50.22 %	0.39 Rf	5.9 AU	22196.2 AU	63.23 %
4	0.43 Rf	2.2 AU	0.50 Rf	292.2 AU	32.53 %	0.55 Rf	8.2 AU	10282.3 AU	29.23 %
5	0.66 Rf	10.7 AU	0.71 Rf	17.3 AU	1.92 %	0.75 Rf	4.5 AU	529.9 AU	1.51 %
6	0.80 Rf	3.3 AU	0.83 Rf	17.7 AU	1.97 %	0.88 Rf	4.3 AU	545.1 AU	1.55 %

At 254 nm

Figure 9: Showing the Densitometric Scan of *MukhaAbhyanga* Sample (*KharapakitaKarpasasthyadiTaila*) (At 9 µl)



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	6.3 AU	0.23 Rf	586.8 AU	31.98 %	0.32 Rf	0.3 AU	5054.1 AU	82.56 %
2	0.34 Rf	0.2 AU	0.36 Rf	54.1 AU	7.41 %	0.45 Rf	2.5 AU	365.0 AU	5.23 %
3	0.45 Rf	2.5 AU	0.52 Rf	49.0 AU	6.71 %	0.55 Rf	7.9 AU	1379.0 AU	7.56 %
4	0.73 Rf	0.1 AU	0.80 Rf	28.5 AU	3.90 %	0.85 Rf	0.3 AU	859.3 AU	4.71 %

At 366 nm

DISCUSSION

The *KarpasasthyadiTaila* obtained in 3 different *Paka* showed slight variation in Refractive Index, Specific Gravity and Acid Value whereas marked variation was observed in Saponification Value, Iodine Value and Unsaponified Matter. Refractive Index indicates density of sample compared to air and liquid media and its value for *MruduPakita, MadhyamaPakita and KharaPakitaKarpasasthyadiTaila*was found to be 1.47106, 1.47006 and 1.47156 respectively. Specific Gravity indicates the weight of a liquid, compared with that of distilled water and its value for *MruduPakita, MadhyamaPakita and KharaPakitaKarpasasthyadiTaila*was found to be 0.9237, 0.9202 and 0.9199 respectively. The Acid Value indicates the presence of free fatty acids in the oil which are responsible of rancidity of the compounds; higher the free fatty acid more is the rancidity. This helps to decide the shelf life of the oil; Acid Value for *MruduPakita, MadhyamaPakita and KharaPakitaKarpasasthyadiTaila* was found to be 23.48, 24.46 and 24.06 respectively. The amount of alkali needed to saponify a given quantity of oil depends upon the number of

COOH group present. The Saponification Value also indicates the average molecular weight /chain length of all fatty acids present. If the chain is longer, then the fatty acids will have low Saponification Value. If the chain is shorter, then the fatty acids will have high Saponification Value. Shorter chain fatty acids (High Saponification Value) have faster rate of absorption than longer chain fatty acids. In the present study, *MruduPakitaKarpasasthyadi-Taila is having very high* Saponification Value (373.63) indicative of faster rate of absorption whereas the Saponification Value of*MadhyamaPakita and KharaPakitaKarpasasthyadi-Taila*was found to be 175.05 and 130.69 respectively which is considerably less than that of *MriduPakitaTaila.* Iodine Value indicates the degree of unsaturation of oil. If the Iodine Value is higher, then the degree of unsaturation is greater in turn results in higher possibility of absorption and atmospheric oxidation leading to rancidity. More Iodine number, the more unsaturated fatty acid bonds are present; unsaturated fatty acid is better absorbed than saturated fatty acids. In the present study, *MruduPakitaKarpasasthyadiTaila is having very high* Iodine Value (76.14) indicative of better absorption whereas the Iodine Value of*MadhyamaPakita and KharaPakitaKarpasasthyadiTaila*was found to be 57.48 and 50.09 respectively which is considerably less than that of *MriduPakitaTaila.* Unsaponifiable Matter indicates components of oils other than fatty acids and its value for *MruduPakita, MadhyamaPakita and KharaPakitaKarpasasthyadiTaila* was found to be 2.00, 1.41 and 1.60 respectively. These constants can be used as standard values to derive quality parameters for *KarpasasthyadiTaila of different Paka.* The HPTLC unfolds the following data:

a) On Photodocumentation, *MriduPakitaKarpasasthyadiTaila (NasyaKarma* Sample) showed 1 major spot at Rf 0.30 (green) under UV 254nm; 3 major spots at Rf 0.07(green), Rf 0.22(blue), Rf 0.47(blue) under UV at 366nm and 5 major spots at Rf 0.13(pink), Rf 0.20 (pink), Rf 0.30 (purple), Rf 0.47(pink) and Rf 0.84 (purple) in daylight after derivatisation in vanillin-sulphuric acid spray reagent. On Densitometric scan, at 254nm, 6 peaks with major peak at Rf 0.42 contributing 58.42% area; at 366nm, 1 peak at Rf 0.33 contributing 100% area was noted.

b) On Photodocumentation, *MadhyamaPakitaKarpasasthyadiTaila (GreevaBasti* Sample) showed 3 major spots at Rf 0.08(green), Rf 0.31(green), Rf 0.45(green) under UV at 254nm; 4 major spots at Rf 0.19(blue), Rf 0.33 (green), Rf 0.45(blue), Rf 0.71(blue) under UV at 366nm and 4 major spots at Rf 0.19(pink), Rf 0.26(purple), Rf 0.34(green), Rf 0.47(green) in daylight after derivatisation in vanillin-sulphuric acid spray reagent. On Densitometric scan, at 254nm, 7 peaks with major peak at Rf 0.35 contributing 61.11% area; at 366nm, 5 peaks with major peak at Rf 0.23 contributing 82.43% area was noted.

c) On Photodocumentation, *KharaPakitaKarpasasthyadiTaila (MukhaAbhyanga* Sample) showed 2 major spots at Rf 0.29(green), Rf 0.43 (green) under UV 254nm; 6 major spots at Rf 0.19 (blue), Rf 0.32(green), Rf 0.45(blue), Rf 0.50(green), Rf 0.57(green), Rf 0.70(blue) under UV at 366nm and 11 major spots at Rf 0.07(purple), Rf 0.12(purple), Rf 0.19(pink), Rf 0.25(purple), Rf 0.32(green), Rf

0.43(pink), Rf 0.47(green), Rf 0.53(purple), Rf 0.65(purple), Rf 0.70(purple), Rf 0.83(purple) in daylight after derivatisation in vanillin-sulphuric acid spray reagent. On Densitometric scan, at 254nm, 6 peaks with major peak at Rf 0.34 contributing 63.23% area; at 366nm, 4 peaks with major peak at Rf 0.23 contributing 82.50% area was noted.

CONCLUSION

KarpasasthyadiTaila is said to be the best in treating *VataVyadhi* and all the details pertaining to its ingredients are explained in *SahasraYoga* and AFI Part-1. The methodical preparation of *Taila* giving due importance to *Paka* helps in getting the desired therapeutic effect based on the route of its administration. The Saponification Value and Iodine Value of *MridupakitaKarpasasthyadiTaila* is found to be higher indicative of faster and better absorption justifying relevance of its indication in *NasyaKarma*. The result of the analytical study with HPTLC, Rf value and Densitometric Scan can be used as the standard quality control test to identify and check the quality as well as the *Paka* of *KarpasasthyadiTaila* prepared as per classical text which can be used for various *Panchakarma* procedures as per the requirement.

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