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Comparative Analytical Study of *Dhutturadi Taila* prepared in two different media

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ABSTRACT

Background: *Sneha Kalpana* is one among the several highly established *Kalpana* of Ayurvedic system of medicine. Many types of *Taila Kalpana* are mentioned in Ayurvedic classics and used effectively in therapeutic practice. *Tila Taila* is the most commonly using *Taila*. However *Narikelataila*, *Erandataila, Sarshapataila*, etc, are also used in special conditions. It is interesting to note that certain preparations are available in the market based on both *TilaTaila* and *Narikela Taila*. This is an attempt to comparatively evaluate the formulation *Dhutturadi Taila* prepared in *Tila Taila* and *Narikela Taila* as the bases. *Dhutturadi Taila* mentioned in *Sahasrayogam* is taken for the present study. **Objectives:** To comparatively analyse *Dhutturadi Taila* samples with classical and advanced analytical techniques. **Materials and Methods:** *Dhutturadi Taila* was prepared using two media i.e. *Narikela Taila* and *Tila Taila*. Both *Taila* samples were comparatively analysed with suitable physicochemical parameters and advanced instrumental methods of analysis. **Conclusion:** As per the existing result it seems that more amount of marker components are extracted into *Tila Taila* medium when compared with *Narikela Taila.*

Key words: *Dhutturadi Taila, Narikela Taila, Tila Taila, Sneha Kalpana.*

INTRODUCTION

Today, movement for globalization of Ayurveda is going on in fast rush up.The world is in a fresh mood to accept this age-old health system too. Meanwhile, people around the country woke up to visualize the drug standards by all possible means to find efficacious and safe medicines; also, it is a timely necessity followed by compulsion to go for quality control of the raw drugs as well as finished products.

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This better serves expectations on efficacy, safety andorganoleptic features. For the standardization of the finished products, it is essential to analyse the prepared drugs or to fix some standards so that quality of the product can be established.

Sneha Kalpana is the unique dosage form in Ayurveda. *Sneha Kalpana* are the versatile oleaginous pharmaceutical dosage form that can be used both externally and internally through multiple routes. The ingredients of *Sneha Kalpana* comprise of *Sneha*, which are glycerides of fatty acid, *Kalka* (paste) which contains many potent therapeutically effective bio constituents and *Drava* (liquid substance), which is the prime source of hydroxyle group and also help in dissolution of active principle into oil, there by enhancing therapeutic value.[1]

Sneha Kalpana is one among the several highly established *Kalpana* of Ayurvedic system of medicine. The main advantage of oily preparation is, the extraction of both fat soluble and water soluble active principles of plants and minerals.[2]

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Oily preparations include not only the oral preparation, but those intended for topical application also. The medicated oil of our pharmacopoeia which are prepared by successively boiling or cooking them with drug decoctions etc.[3]

Many types of *Taila Kalpana* are mentioned in Ayurvedic classics and used effectively in therapeutic practice. *Tila Taila*[4-6] is the most commonly using *Taila*. However *Narikela Taila,*[7-9] *Eranda Taila, Sarshapa Taila*, etc. are also used in special conditions.

It is interesting to note that certain preparations are available in the market based on both *TilaTaila* and *NarikelaTaila.*

This is an attempt to comparatively evaluate the formulation *Dhutturadi Taila*[10] prepared in *TilaTaila* and *NarikelaTaila* as the bases.

Observations and Results

Table 1: Showing organoleptic characters of *Dhutturadi Kera Taila.*

Characters	Observation of A1	Observation of A2	Observation of A3
Colour	Golden yellowish	Golden yellowish	Golden yellowish
Smell	Having smell of *Dhattura*	Having smell of *Dhattura*	Having smell of *Dhattura*
Consistency	Liquid,oily	Liquid, oily	Liquid, oily
Appearance	Oily	Oily	Oily
A - *Dhutturadi Kera Taila.*			

Table 2: Showing organoleptic characters of *Dhutturadi Taila.*

Characters	Observation of B1	Observation of B2	Observation of B3
Colour	Brownish yellow	Brownish yellow	Brownish yellow
Smell	Having smell of *Dhattura*	Having smell of *Dhattura*	Having smell of *Dhattura*
Consistency	Liquid,oily	Liquid,oily	Liquid,oily
Appearance	Oily	Oily	Oily
B - *Dhutturadi Taila.*			

Table 3: Showing Loss on Drying of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
1.0%	0.6%	1.0%	0.16%	0.10%	0.24%
A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*					

Table 4: Showing specific gravity of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
0.8400	0.8600	0.8000	0.8236	0.8370	0.8362
A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*					

Table 5: Showing viscosity of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

Sample No.	Viscosity (CP)	Temperature°C
A1	39.4	31.0
A2	39.0	31.3
A3	38.6	31.5
B1	47.7	31.5
B2	47.1	31.5
B3	47.7	31.6
A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*		

Table 6: Showing Refractive index at 40°C of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
1.4876	1.4843	1.4874	1.4148	1.4149	1.4149

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A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 7: Showing Acid value of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
4.34	3.94	3.94	14.49	14.82	14.42

A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 8: Showing Iodine value of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
25.38	22.84	25.38	76.1	76.1	76

A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 9: Showing Saponification value of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
192.3	189.5	199.8	128.5	138.1	138.3

A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 10: showing Peroxide value of *Dhutturadi Kera Taila* and *Dhutturadi Taila*

A1	A2	A3	B1	B2	B3
6.0	6.0	6.0	12.O	10.0	10.0

A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 11: Showing tests for free fatty acids of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

A1	A2	A3	B1	B2	B3
2.18	1.98	1.98	7.24	7.45	7.65

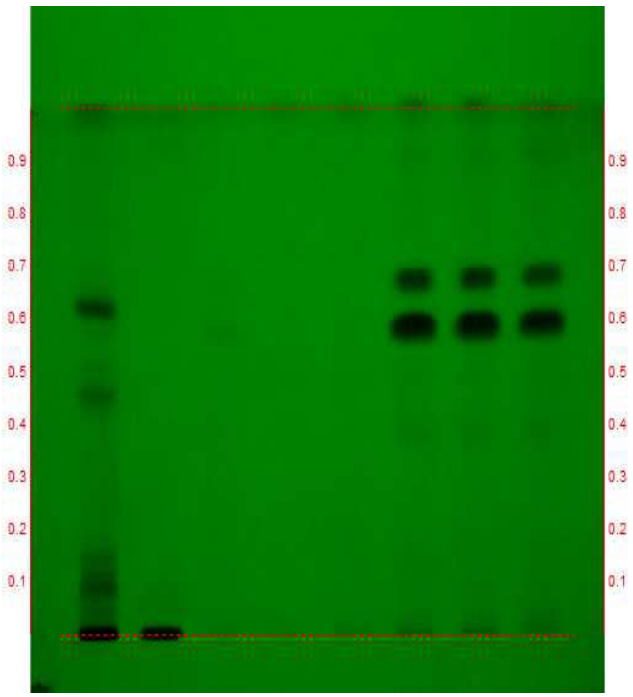
A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Table 12: Showing test for rancidity of *Dhutturadi Kera Taila* and *Dhutturadi Taila.*

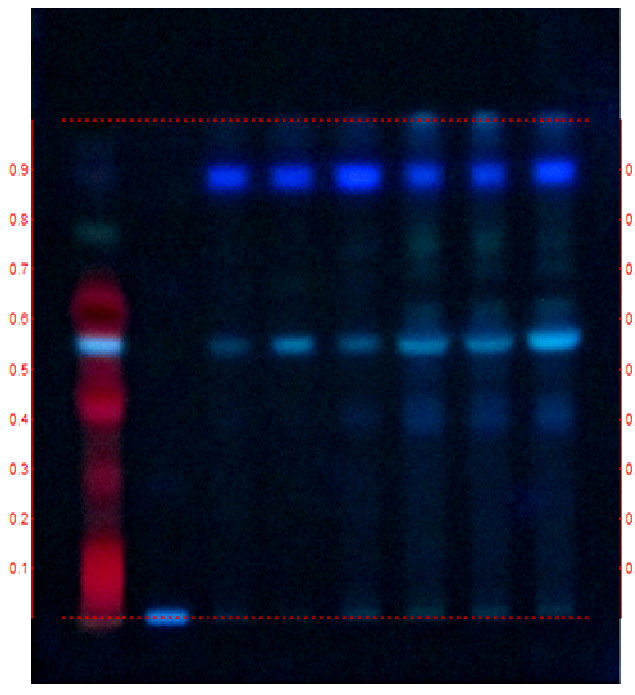
A1	A2	A3	B1	B2	B3
Negativ e	Negativ e	Negativ e	Negativ e	Negativ e	Negativ e

A - *Dhutturadi Kera Taila,* B - *Dhutturadi Taila.*

Figure 1: TLC photo documentation of unsaponifiable matter.



At 254 nm



At 366 nm

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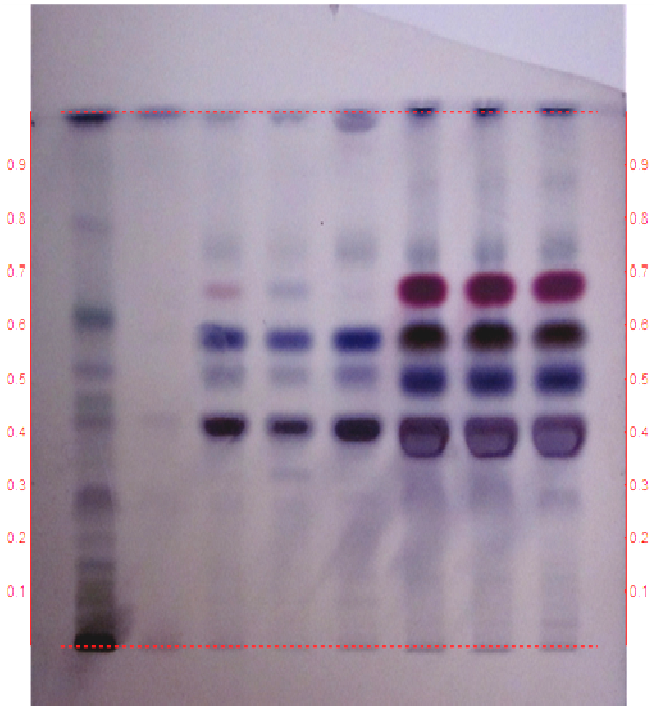

Post derivatisation

A1-8 µl, A2- 8µl, A3-8µl, B1- 8µl, B2- 8µl, B3- 8µl

Track 1 - Alcohol extract of *Dhattura* leaves - 10 µl, Track 2 - Hyoscyamine -15 µl, Track 3 - Chloroform extract of unsaponifiable matter of *Dhutturadi Kera*, Track 4 - Chloroform extract of unsaponifiable matter of *Dhutturadi Kera*, Track 5 - Chloroform extract of unsaponifiable matter of *Dhutturadi Kera,* Track 6 - Chloroform extract of unsaponifiable matter of *Dhutturadi Taila*, Track 7 - Chloroform extract of unsaponifiable matter of *Dhutturadi Taila,* Track 8 - Chloroform extract of unsaponifiable matter of *Dhutturadi Taila.*

Solvent system - Toluene : Ethyl acetate (9:1)

Table 13: R_f value of all the tracks at 254 nm

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8
0.04 L green	-	-	-	-	-	-	-
0.09 D green							
0.11 D green	-	-	-	-	-	-	-
0.15 D green	-	-	-	-	-	-	-
-	-	-	-	-	0.39 L green	0.39 L green	0.39 L green
0.45 D green	-	-	-	-	-	-	-
-	-	-	0.48 L green	-	-	-	-
0.50 L green	-	-	-	-	-	-	-
-	-	0.59 L green	-	-	0.59 d green	0.59 d green	0.59 d green
0.62 d green	-	-	-	-	-	-	-
-	-	-	-	-	0.67 D green	0.67 D green	0.67 D green
-	-	-	-	-	0.92 L green	0.92 L green	0.92 L green

Table 14: R_f value of all the tracks at 366 nm

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8
0.09 F pink	-	-	-	-	-	-	-
0.28 F pink	0.28 F violet	-	-	-	-	-	-

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-	-	-	-	0.40 F blue	0.40 F blue	0.40 F blue	0.40 F blue
0.43 f pink	-	-	-	-	0.43 F blue	0.43 F blue	0.43 F blue
0.54 F blue	-	0.54 F blue	0.54 F blue	0.54 F blue	0.54 F blue	0.54 F blue	0.54 F blue
0.61 F pink	-	-	-	-	0.61 F blue	0.61 F blue	0.61 F blue
-	-	-	-	-	0.65 F brown	0.65 F brown	0.65 F brown
-	-	0.67 F green	0.67 F green	-	-	-	-
-	-	-	-	-	0.69 F blue	0.69 F blue	0.69 F blue
-	-	-	-	0.73 F green	-	-	-
0.77 F green	-	-	-	-	-	-	-
0.88 F purple	-	0.88 F violet	0.88 F violet	0.88 F violet	0.88 F violet	0.88 F violet	0.88 F violet
-	-	-	0.96 F blue	0.96 F blue	0.96 F blue	0.96 F blue	0.96 F blue

Table 15: R_f value of all the tracks after derivatisation

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8
0.04 Brown	-	-	-	-	-	-	-
0.09 Brown	-	0.09 Purple	0.09 Purple	0.09 Purple	0.09 Purple	0.09 Purple	0.09 Purple
0.11 Purple	-	-	-	-	-	-	-
0.14 Purple	-	0.14 Purple	0.14 Purple	0.14 Purple	0.14 Purple	0.14 Purple	0.14 Purple
0.20 Purple	-	-	-	-	-	-	-
0.28 Purple	0.28 Purple	0.28 Purple	0.28 Purple	0.28 Purple	0.28 Purple	0.28 Purple	0.28 Purple
-	-	0.31 Purple	0.31 Purple	0.31 Purple	0.31 Purple	0.31 Purple	0.31 Purple
0.42 Purple	0.42 purple	0.42 Purple	0.42 Purple	0.42 Purple	0.42 Purple	0.42 Purple	0.42 Purple
0.46 Blue	-	-	-	-	-	-	-
0.50 Purple	-	0.50 Blue	0.50 Blue	0.50 Blue	0.50 Blue	0.50 Blue	0.50 Blue
-	-	0.58 D blue	0.58 D blue	0.58 D blue	0.58 D blue	0.58 D blue	0.58 D blue
0.61 D green	-	-	-	-	-	-	-
-	-	0.66 Pink	0.66 Green	-	0.66 Pink	0.66 Pink	0.66 Pink
-	-	0.74 Blue	0.74 Blue	0.74 Blue	0.74 Blue	0.74 Blue	0.74 Blue
0.78 Brown	-	-	-	-	-	-	-
0.89 L	-	-	-	-	-	-	-

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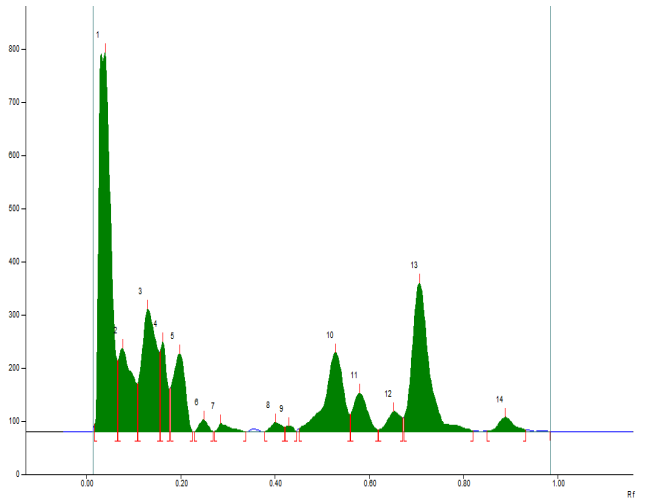
blue							

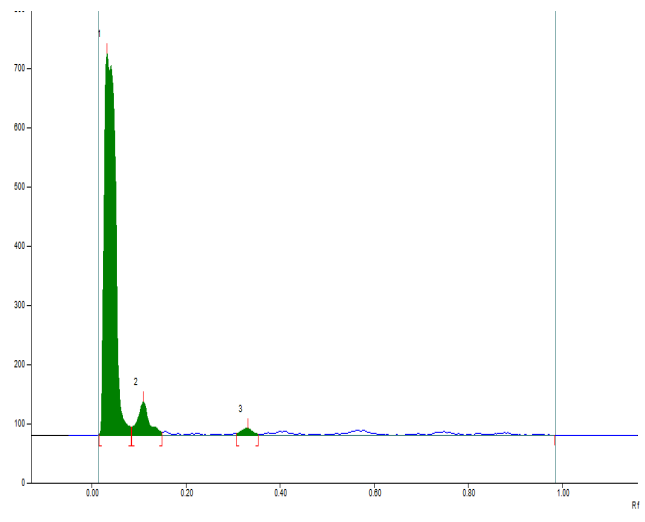
Figure 2: HPTL C Densitometric scan at UV 254 nm



Track 1, ID: Alcoholic extract of Datura leaves

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	13.2 AU	0.04 Rf	712.8 AU	34.76 %	0.07 Rf	32.9 AU	12672.6 AU	31.13 %
2	0.07 Rf	134.6 AU	0.08 Rf	156.7 AU	7.64 %	0.11 Rf	89.3 AU	3250.7 AU	7.99 %
3	0.11 Rf	90.5 AU	0.13 Rf	230.5 AU	11.24 %	0.16 Rf	48.5 AU	5237.5 AU	12.87 %
4	0.16 Rf	152.1 AU	0.16 Rf	169.6 AU	8.27 %	0.18 Rf	79.7 AU	1658.8 AU	4.08 %
5	0.18 Rf	81.9 AU	0.20 Rf	147.2 AU	7.18 %	0.23 Rf	0.8 AU	2686.0 AU	6.60 %
6	0.23 Rf	0.0 AU	0.25 Rf	22.0 AU	1.08 %	0.27 Rf	0.2 AU	281.3 AU	0.69 %
7	0.27 Rf	0.3 AU	0.29 Rf	16.0 AU	0.78 %	0.34 Rf	0.1 AU	268.3 AU	0.66 %
8	0.38 Rf	0.1 AU	0.40 Rf	17.7 AU	0.86 %	0.42 Rf	8.8 AU	279.2 AU	0.69 %
9	0.42 Rf	9.0 AU	0.43 Rf	11.1 AU	0.54 %	0.45 Rf	0.4 AU	124.3 AU	0.31 %
10	0.45 Rf	6.1 AU	0.53 Rf	149.0 AU	7.27 %	0.56 Rf	31.8 AU	4121.4 AU	10.13 %
11	0.56 Rf	33.0 AU	0.58 Rf	72.9 AU	3.55 %	0.62 Rf	3.6 AU	1537.8 AU	3.78 %
12	0.62 Rf	3.7 AU	0.65 Rf	38.0 AU	1.85 %	0.67 Rf	25.8 AU	772.3 AU	1.90 %
13	0.67 Rf	26.7 AU	0.71 Rf	279.7 AU	13.64 %	0.82 Rf	1.3 AU	7188.1 AU	17.66 %
14	0.85 Rf	1.0 AU	0.89 Rf	27.2 AU	1.32 %	0.93 Rf	3.9 AU	626.3 AU	1.54 %

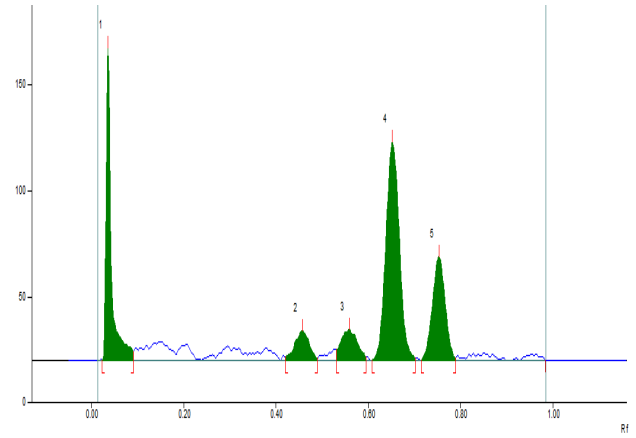
Alcohol extract of *Dhattura* leaves- 10 µl



Track 2, ID: Hyocymine in methanol

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.6 AU	0.03 Rf	644.4 AU	90.32 %	0.08 Rf	14.1 AU	11110.9 AU	90.12 %
2	0.09 Rf	14.2 AU	0.11 Rf	57.1 AU	8.00 %	0.15 Rf	5.5 AU	1002.7 AU	8.13 %
3	0.31 Rf	3.1 AU	0.33 Rf	12.0 AU	1.68 %	0.35 Rf	2.4 AU	215.2 AU	1.75 %

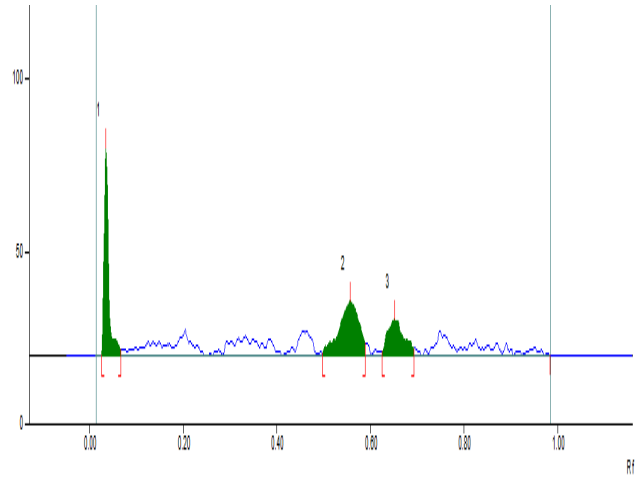
Hyoscyamine -15 µl



Track 3, ID: Unsaponifiable matter of Daturadi keram A1

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.3 AU	0.04 Rf	147.9 AU	44.93 %	0.09 Rf	4.3 AU	1231.7 AU	24.30 %
2	0.42 Rf	1.7 AU	0.46 Rf	13.9 AU	4.21 %	0.49 Rf	1.1 AU	318.3 AU	6.28 %
3	0.53 Rf	5.3 AU	0.56 Rf	14.9 AU	4.52 %	0.60 Rf	1.5 AU	373.5 AU	7.37 %
4	0.61 Rf	0.2 AU	0.65 Rf	103.3 AU	31.40 %	0.70 Rf	1.0 AU	2163.7 AU	42.68 %
5	0.72 Rf	0.1 AU	0.75 Rf	49.1 AU	14.93 %	0.79 Rf	1.3 AU	982.5 AU	19.38 %

Unsaponifiable matter of *Daturadikera* A1-8 µl



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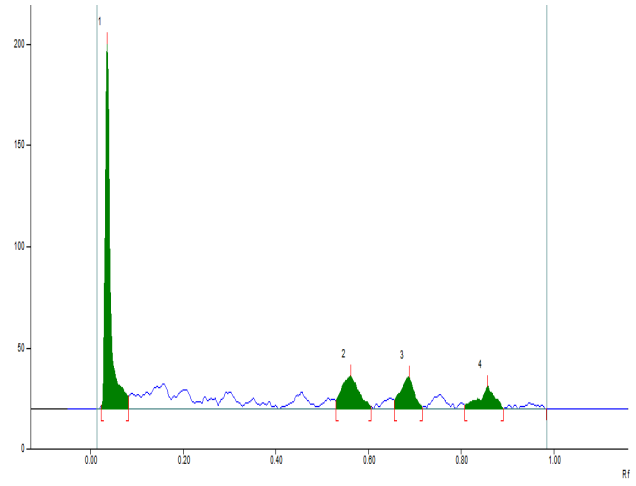
Track 4, ID: Unsaponifiable matter of Daturadi keram A2

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	0.1 AU	0.04 Rf	60.0 AU	69.74 %	0.07 Rf	1.7 AU	418.5 AU	36.37 %
2	0.50 Rf	0.5 AU	0.56 Rf	15.5 AU	18.08 %	0.59 Rf	3.7 AU	471.0 AU	40.94 %
3	0.63 Rf	0.9 AU	0.65 Rf	10.5 AU	12.18 %	0.69 Rf	2.0 AU	261.0 AU	22.68 %

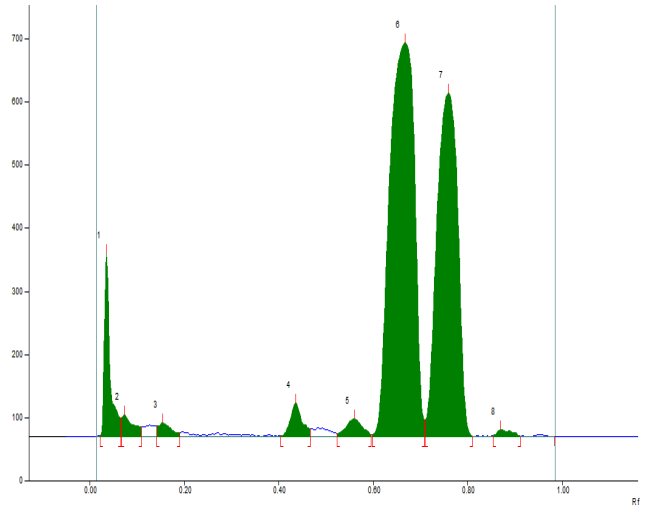
Unsaponifiable matter of *Daturadikera* A2- 8µl



Track 5, ID: Unsaponifiable matter of Daturadi keram A3

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.5 AU	0.04 Rf	180.4 AU	80.67 %	0.08 Rf	6.5 AU	1465.1 AU	58.86 %
2	0.53 Rf	4.1 AU	0.56 Rf	16.2 AU	7.26 %	0.61 Rf	1.3 AU	431.4 AU	17.33 %
3	0.66 Rf	4.4 AU	0.69 Rf	15.8 AU	7.08 %	0.72 Rf	0.7 AU	331.2 AU	13.31 %
4	0.81 Rf	1.9 AU	0.86 Rf	11.2 AU	4.99 %	0.89 Rf	0.1 AU	261.6 AU	10.51 %

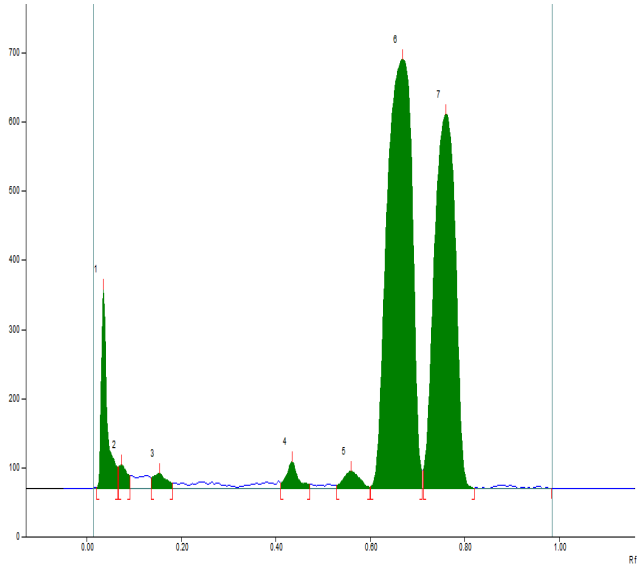
Unsaponifiable matter of *Daturadikera* A3-8µl



Track 6, ID: Unsaponifiable matter of Daturadi tailam B1

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.4 AU	0.04 Rf	289.9 AU	18.08 %	0.07 Rf	28.8 AU	2559.6 AU	5.52 %
2	0.07 Rf	29.2 AU	0.07 Rf	33.9 AU	2.11 %	0.11 Rf	15.0 AU	608.8 AU	1.31 %
3	0.14 Rf	16.6 AU	0.15 Rf	21.4 AU	1.33 %	0.19 Rf	5.8 AU	437.1 AU	0.94 %
4	0.40 Rf	1.2 AU	0.44 Rf	53.2 AU	3.32 %	0.47 Rf	12.5 AU	947.2 AU	2.04 %
5	0.52 Rf	4.4 AU	0.56 Rf	28.0 AU	1.75 %	0.60 Rf	3.4 AU	711.6 AU	1.54 %
6	0.60 Rf	3.4 AU	0.67 Rf	622.6 AU	38.84 %	0.71 Rf	26.1 AU	23550.0 AU	50.83 %
7	0.71 Rf	26.5 AU	0.76 Rf	543.6 AU	33.91 %	0.81 Rf	0.5 AU	17272.7 AU	37.28 %
8	0.85 Rf	2.0 AU	0.87 Rf	10.4 AU	0.65 %	0.91 Rf	0.6 AU	243.6 AU	0.53 %

Unsaponifiable matter of *Daturaditaila*B1- 8µl



Track 7, ID: Unsaponifiable matter of Daturadi tailam B2

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	2.0 AU	0.04 Rf	287.6 AU	18.35 %	0.07 Rf	30.4 AU	2611.9 AU	5.72 %
2	0.07 Rf	31.0 AU	0.07 Rf	34.1 AU	2.18 %	0.09 Rf	18.8 AU	440.8 AU	0.96 %
3	0.14 Rf	15.9 AU	0.15 Rf	22.1 AU	1.41 %	0.18 Rf	8.1 AU	455.7 AU	1.00 %
4	0.41 Rf	7.9 AU	0.44 Rf	38.6 AU	2.46 %	0.47 Rf	5.5 AU	667.9 AU	1.46 %
5	0.53 Rf	5.1 AU	0.56 Rf	24.7 AU	1.58 %	0.60 Rf	2.1 AU	613.8 AU	1.34 %
6	0.60 Rf	2.4 AU	0.67 Rf	619.4 AU	39.52 %	0.71 Rf	25.5 AU	23585.8 AU	51.63 %
7	0.71 Rf	26.5 AU	0.76 Rf	540.8 AU	34.51 %	0.82 Rf	0.6 AU	17308.5 AU	37.89 %

Unsaponifiable matter of *Daturaditaila* B2- 8µl

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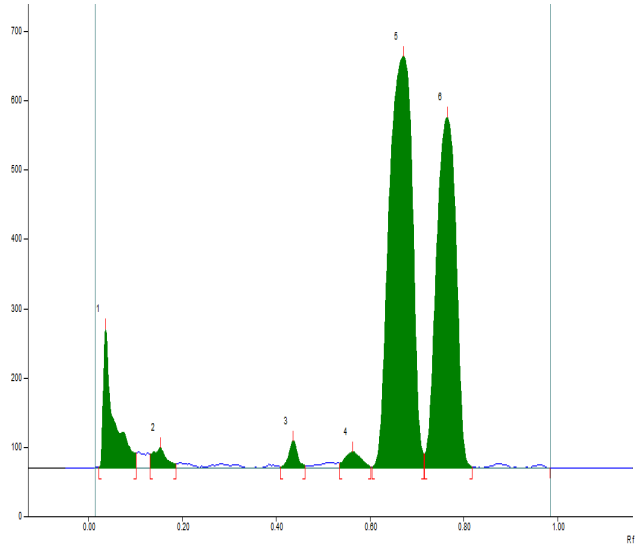
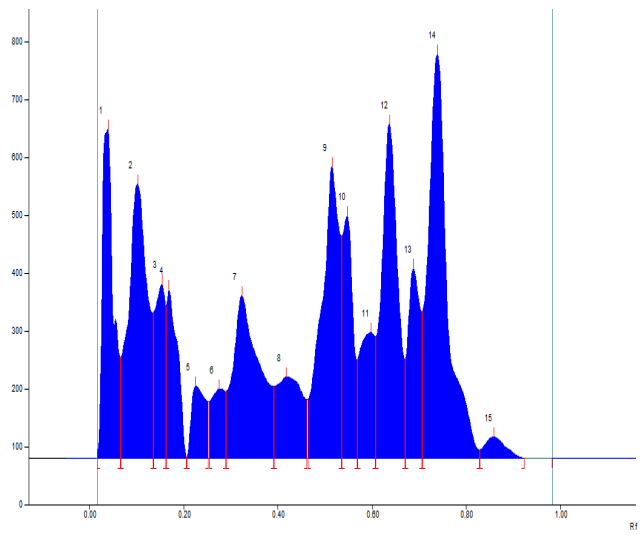


Track 8, ID: Unsaponifiable matter of Daturadi tailam B3

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.7 AU	0.04 Rf	200.1 AU	14.39 %	0.10 Rf	21.6 AU	3231.5 AU	7.86 %
2	0.13 Rf	19.7 AU	0.15 Rf	29.1 AU	2.09 %	0.19 Rf	5.9 AU	609.3 AU	1.48 %
3	0.41 Rf	1.3 AU	0.44 Rf	39.4 AU	2.83 %	0.46 Rf	3.8 AU	539.2 AU	1.31 %
4	0.54 Rf	6.9 AU	0.56 Rf	23.6 AU	1.70 %	0.60 Rf	1.8 AU	578.4 AU	1.41 %
5	0.60 Rf	1.9 AU	0.67 Rf	593.3 AU	42.65 %	0.72 Rf	19.7 AU	21029.8 AU	51.15 %
6	0.72 Rf	20.0 AU	0.77 Rf	505.6 AU	36.35 %	0.82 Rf	1.4 AU	15128.9 AU	36.79 %

Unsaponifiable matter of *Daturaditaila* B3- 8µl

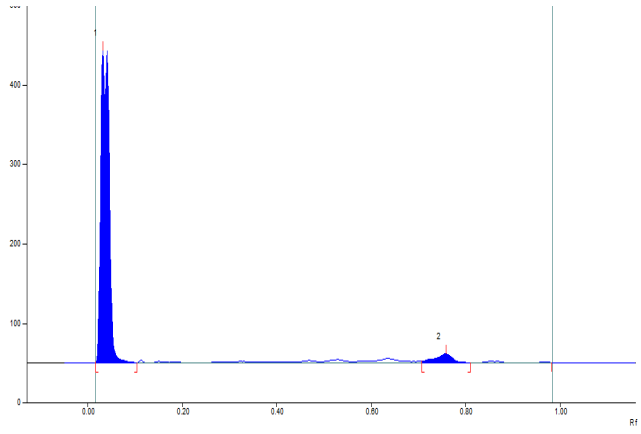
Figure 3: HPTLC Densitometry scan at UV 366 nm



Track 1, ID: Alcoholic extract of Datura leaves

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	9.4 AU	0.04 Rf	567.5 AU	11.19 %	0.07 Rf	74.1 AU	9705.2 AU	7.93 %
2	0.07 Rf	175.2 AU	0.10 Rf	472.5 AU	9.32 %	0.14 Rf	49.8 AU	13793.3 AU	11.27 %
3	0.14 Rf	251.1 AU	0.15 Rf	300.5 AU	5.92 %	0.16 Rf	60.6 AU	4706.7 AU	3.84 %
4	0.16 Rf	263.5 AU	0.17 Rf	291.3 AU	5.74 %	0.21 Rf	0.9 AU	4742.3 AU	3.87 %
5	0.21 Rf	2.4 AU	0.23 Rf	124.3 AU	2.45 %	0.25 Rf	97.0 AU	2725.8 AU	2.23 %
6	0.25 Rf	97.4 AU	0.28 Rf	119.4 AU	2.35 %	0.29 Rf	14.5 AU	2577.5 AU	2.11 %
7	0.29 Rf	115.1 AU	0.32 Rf	280.3 AU	5.53 %	0.39 Rf	23.6 AU	11426.7 AU	9.33 %
8	0.39 Rf	123.7 AU	0.42 Rf	140.3 AU	2.77 %	0.46 Rf	00.8 AU	5591.9 AU	4.57 %
9	0.46 Rf	101.2 AU	0.52 Rf	502.1 AU	9.90 %	0.54 Rf	83.0 AU	13738.0 AU	11.22 %
10	0.54 Rf	383.2 AU	0.55 Rf	417.8 AU	8.24 %	0.57 Rf	69.3 AU	6789.6 AU	5.55 %
11	0.57 Rf	172.0 AU	0.60 Rf	216.8 AU	4.27 %	0.61 Rf	09.9 AU	4912.1 AU	4.01 %
12	0.61 Rf	210.4 AU	0.64 Rf	576.7 AU	11.37 %	0.67 Rf	67.8 AU	14097.1 AU	11.51 %
13	0.67 Rf	172.2 AU	0.69 Rf	328.1 AU	6.47 %	0.71 Rf	52.9 AU	5977.5 AU	4.88 %
14	0.71 Rf	253.3 AU	0.74 Rf	697.4 AU	13.75 %	0.83 Rf	14.1 AU	20498.4 AU	16.74 %
15	0.83 Rf	14.3 AU	0.86 Rf	36.7 AU	0.72 %	0.92 Rf	0.3 AU	1148.7 AU	0.94 %

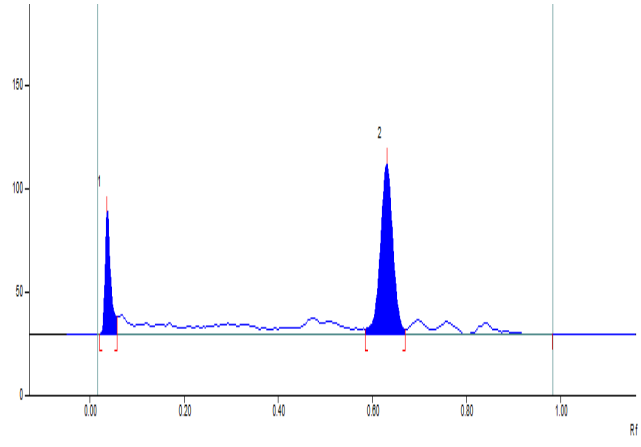
Alcohol extract of *Datura* leaves- 10 µl



Track 2, ID: Hyocymine in methanol

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.7 AU	0.03 Rf	394.0 AU	97.20 %	0.10 Rf	0.5 AU	5128.0 AU	94.29 %
2	0.71 Rf	2.4 AU	0.76 Rf	11.4 AU	2.80 %	0.81 Rf	0.2 AU	310.3 AU	5.71 %

Hyoscyamine -15µl



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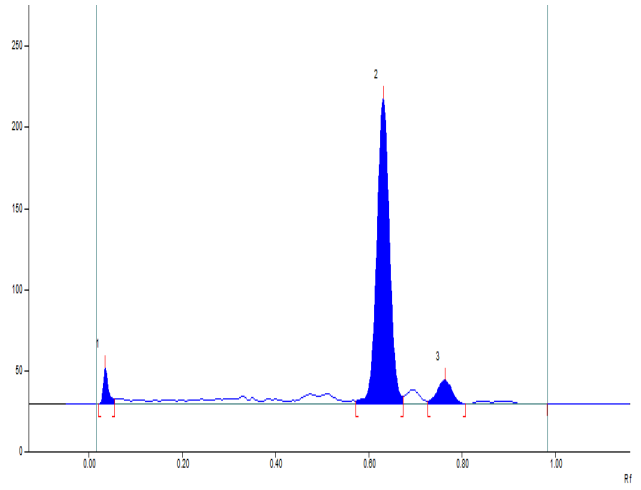
Track 3, ID: Unsaponifiable matter of Daturadi keram A1

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.0 AU	0.04 Rf	59.5 AU	41.86 %	0.06 Rf	8.6 AU	515.3 AU	24.53 %
2	0.59 Rf	2.7 AU	0.63 Rf	82.6 AU	58.14 %	0.67 Rf	2.2 AU	1585.7 AU	75.47 %

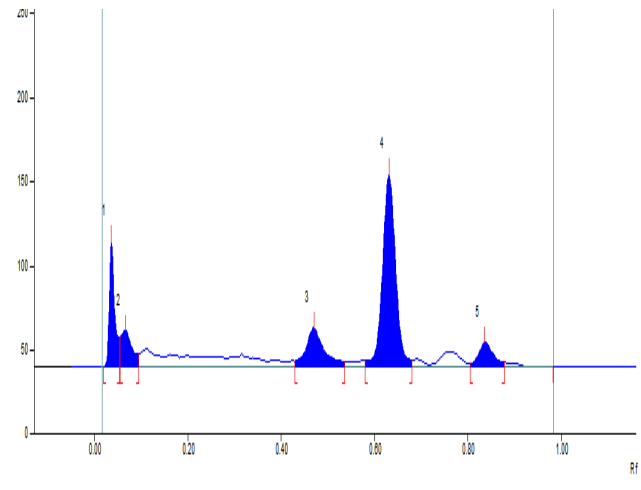
Unsaponifiable matter of *Daturadikera* A1-8 µl



Track 4, ID: Unsaponifiable matter of Daturadi keram A2

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.0 AU	0.04 Rf	22.5 AU	9.99 %	0.06 Rf	3.1 AU	174.5 AU	4.17 %
2	0.57 Rf	1.8 AU	0.63 Rf	188.4 AU	83.52 %	0.67 Rf	4.3 AU	3678.5 AU	87.91 %
3	0.73 Rf	1.7 AU	0.76 Rf	14.6 AU	6.49 %	0.81 Rf	0.2 AU	331.6 AU	7.93 %

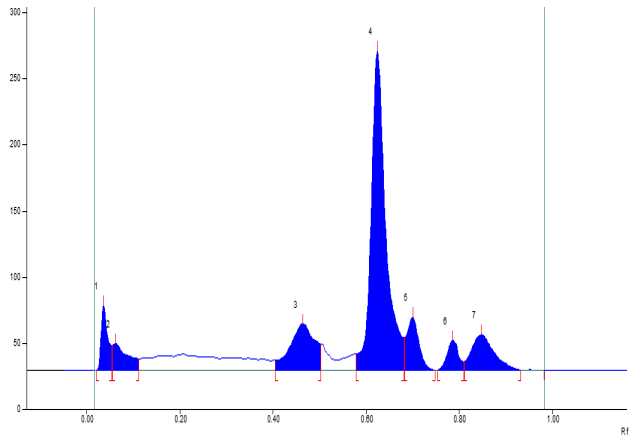
Unsaponifiable matter of *Daturadikera* A2- 8µl



Track 5, ID: Unsaponifiable matter of Daturadi keram A3

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.0 AU	0.04 Rf	74.5 AU	30.03 %	0.05 Rf	17.4 AU	631.9 AU	14.63 %
2	0.06 Rf	17.7 AU	0.07 Rf	21.8 AU	8.80 %	0.10 Rf	7.5 AU	369.3 AU	8.55 %
3	0.43 Rf	3.4 AU	0.47 Rf	22.9 AU	9.24 %	0.54 Rf	2.6 AU	647.1 AU	14.99 %
4	0.58 Rf	3.6 AU	0.63 Rf	114.4 AU	46.09 %	0.68 Rf	4.3 AU	2333.8 AU	54.05 %
5	0.81 Rf	1.6 AU	0.84 Rf	14.5 AU	5.83 %	0.88 Rf	2.6 AU	335.5 AU	7.77 %

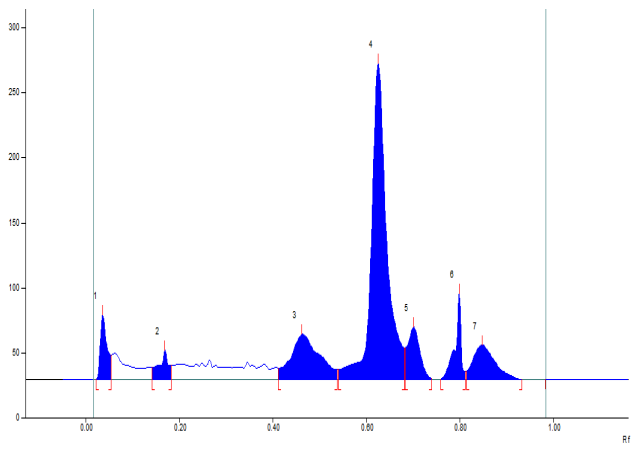
Unsaponifiable matter of *Daturadikera* A3-8µl



Track 6, ID: Unsaponifiable matter of Daturadi tailam B1

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.1 AU	0.04 Rf	49.2 AU	11.28 %	0.05 Rf	18.8 AU	516.3 AU	5.20 %
2	0.06 Rf	18.8 AU	0.06 Rf	20.1 AU	4.62 %	0.11 Rf	8.8 AU	478.9 AU	4.83 %
3	0.41 Rf	7.5 AU	0.46 Rf	35.4 AU	8.11 %	0.50 Rf	19.7 AU	1329.6 AU	13.40 %
4	0.58 Rf	12.2 AU	0.63 Rf	241.2 AU	55.34 %	0.68 Rf	24.5 AU	5500.3 AU	55.44 %
5	0.68 Rf	24.6 AU	0.70 Rf	40.2 AU	9.21 %	0.75 Rf	0.1 AU	755.6 AU	7.62 %
6	0.75 Rf	0.1 AU	0.79 Rf	22.9 AU	5.26 %	0.81 Rf	6.6 AU	404.4 AU	4.08 %
7	0.81 Rf	6.8 AU	0.85 Rf	26.9 AU	6.17 %	0.93 Rf	0.2 AU	936.4 AU	9.44 %

Unsaponifiable matter of *Daturaditaila* B1- 8µl



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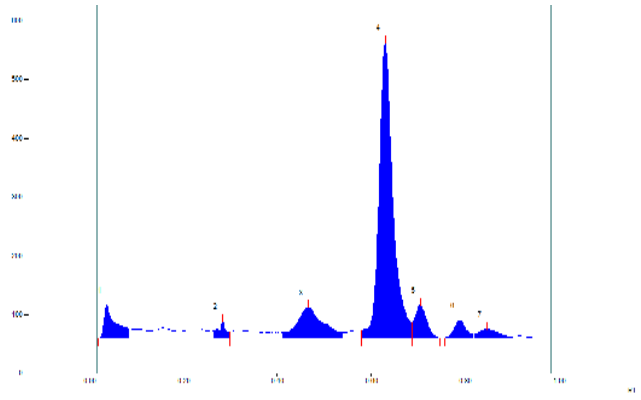
Track 7, ID: Unsaponifiable matter of Daturadi tailam B2

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.1 AU	0.04 Rf	49.4 AU	10.22 %	0.05 Rf	18.7 AU	525.4 AU	5.04 %
2	0.14 Rf	9.4 AU	0.17 Rf	22.8 AU	4.72 %	0.18 Rf	10.6 AU	334.9 AU	3.21 %
3	0.41 Rf	8.5 AU	0.46 Rf	34.8 AU	7.20 %	0.54 Rf	7.5 AU	1507.8 AU	14.46 %
4	0.54 Rf	7.6 AU	0.63 Rf	243.1 AU	50.27 %	0.68 Rf	24.1 AU	5798.5 AU	55.60 %
5	0.68 Rf	24.1 AU	0.70 Rf	40.4 AU	8.36 %	0.74 Rf	0.7 AU	763.2 AU	7.32 %
6	0.76 Rf	0.1 AU	0.80 Rf	66.4 AU	13.74 %	0.81 Rf	6.2 AU	613.5 AU	5.88 %
7	0.81 Rf	6.3 AU	0.85 Rf	26.6 AU	5.49 %	0.93 Rf	0.0 AU	885.0 AU	8.49 %

Unsaponifiable matter of *Daturaditaila* B2- 8µl



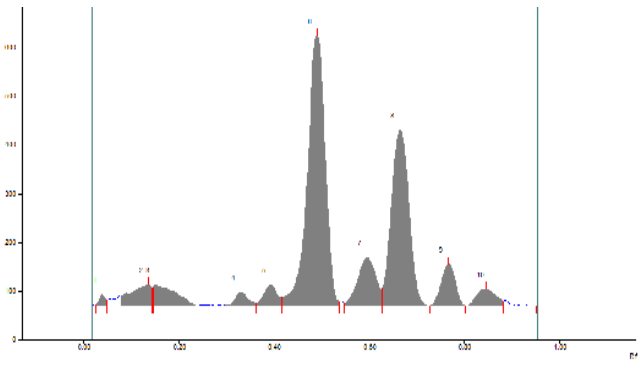
Track 8, ID: Unsaponifiable matter of Daturadi tailam B3

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	0.1 AU	0.04 Rf	55.4 AU	7.47 %	0.09 Rf	15.9 AU	1011.0 AU	6.29 %
2	0.27 Rf	12.8 AU	0.29 Rf	29.0 AU	3.91 %	0.30 Rf	11.3 AU	345.6 AU	2.15 %
3	0.41 Rf	9.0 AU	0.47 Rf	52.2 AU	7.05 %	0.54 Rf	9.2 AU	2076.6 AU	12.91 %
4	0.58 Rf	14.2 AU	0.63 Rf	503.1 AU	67.90 %	0.69 Rf	27.3 AU	10619.2 AU	66.02 %
5	0.69 Rf	27.5 AU	0.71 Rf	55.7 AU	7.52 %	0.75 Rf	0.1 AU	1025.3 AU	6.37 %
6	0.76 Rf	0.4 AU	0.79 Rf	30.5 AU	4.12 %	0.82 Rf	6.0 AU	537.4 AU	3.34 %
7	0.82 Rf	6.1 AU	0.85 Rf	15.0 AU	2.02 %	0.90 Rf	2.5 AU	469.4 AU	2.92 %

Unsaponifiable matter of *Daturaditaila* B3- 8µl

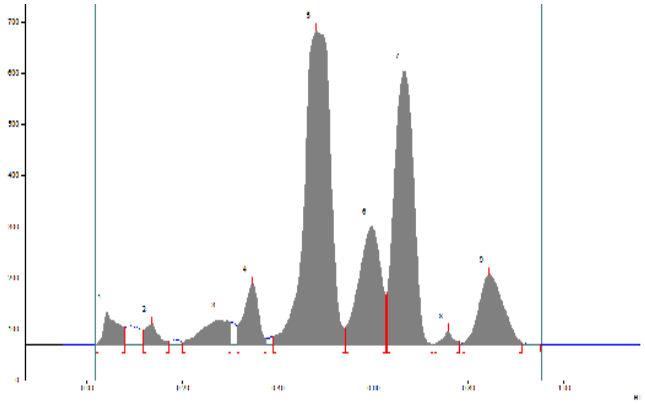
Figure4: HPTLC densitometric scan after derivatisation

Unsaponifiable matter of *Daturadikera* A1-8 µl



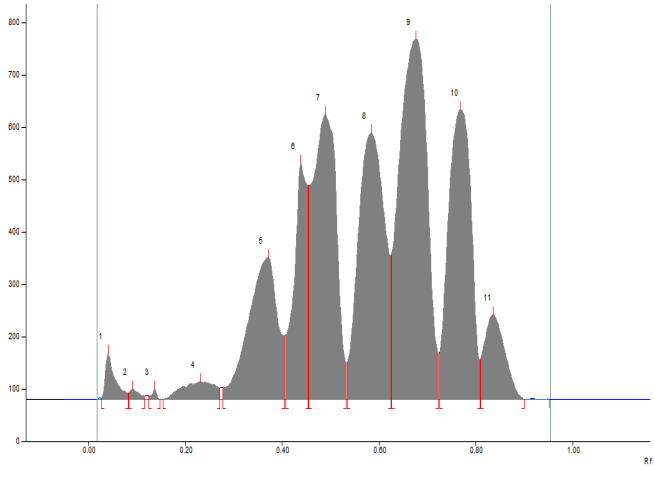
Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	3.4 AU	0.04 Rf	22.9 AU	1.74 %	0.05 Rf	12.9 AU	218.6 AU	0.63 %
2	0.08 Rf	20.7 AU	0.14 Rf	43.8 AU	3.32 %	0.15 Rf	37.0 AU	1371.8 AU	3.97 %
3	0.15 Rf	38.1 AU	0.15 Rf	43.5 AU	3.30 %	0.24 Rf	3.1 AU	1452.3 AU	4.21 %
4	0.30 Rf	1.2 AU	0.33 Rf	27.9 AU	2.12 %	0.36 Rf	5.7 AU	545.0 AU	1.58 %
5	0.36 Rf	5.7 AU	0.40 Rf	44.1 AU	3.35 %	0.42 Rf	16.7 AU	859.4 AU	2.49 %
6	0.42 Rf	16.8 AU	0.49 Rf	554.8 AU	42.07 %	0.54 Rf	9.5 AU	14975.6 AU	43.38 %
7	0.55 Rf	6.0 AU	0.60 Rf	99.6 AU	7.56 %	0.63 Rf	34.6 AU	2737.7 AU	7.93 %
8	0.63 Rf	36.3 AU	0.67 Rf	361.0 AU	27.38 %	0.72 Rf	0.3 AU	9553.6 AU	27.67 %
9	0.73 Rf	0.6 AU	0.77 Rf	86.1 AU	6.53 %	0.80 Rf	0.6 AU	1786.7 AU	5.18 %
10	0.81 Rf	0.5 AU	0.85 Rf	34.7 AU	2.63 %	0.88 Rf	9.7 AU	1020.4 AU	2.96 %

Unsaponifiable matter of*Daturadikera*A2- 8µl



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.1 AU	0.04 Rf	63.5 AU	3.50 %	0.08 Rf	34.2 AU	1384.9 AU	2.33 %
2	0.12 Rf	29.5 AU	0.14 Rf	41.2 AU	2.27 %	0.17 Rf	6.2 AU	804.1 AU	1.35 %
3	0.20 Rf	5.0 AU	0.28 Rf	48.4 AU	2.67 %	0.30 Rf	43.6 AU	2004.0 AU	3.38 %
4	0.32 Rf	37.9 AU	0.35 Rf	118.9 AU	6.56 %	0.38 Rf	12.4 AU	2572.5 AU	4.33 %
5	0.39 Rf	16.2 AU	0.48 Rf	612.5 AU	33.79 %	0.54 Rf	32.4 AU	24087.0 AU	40.58 %
6	0.54 Rf	33.4 AU	0.60 Rf	230.5 AU	12.71 %	0.63 Rf	98.0 AU	7665.0 AU	12.91 %
7	0.63 Rf	101.3 AU	0.67 Rf	534.5 AU	29.48 %	0.73 Rf	0.2 AU	15440.3 AU	26.01 %
8	0.73 Rf	0.2 AU	0.76 Rf	25.9 AU	1.43 %	0.78 Rf	5.6 AU	386.3 AU	0.65 %
9	0.79 Rf	2.3 AU	0.85 Rf	137.5 AU	7.59 %	0.91 Rf	4.0 AU	5019.4 AU	8.46 %

Unsaponifiable matter of *Daturadikera* A3-8µl



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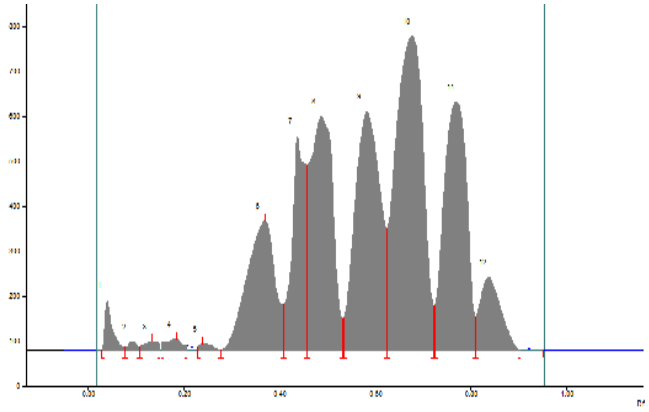
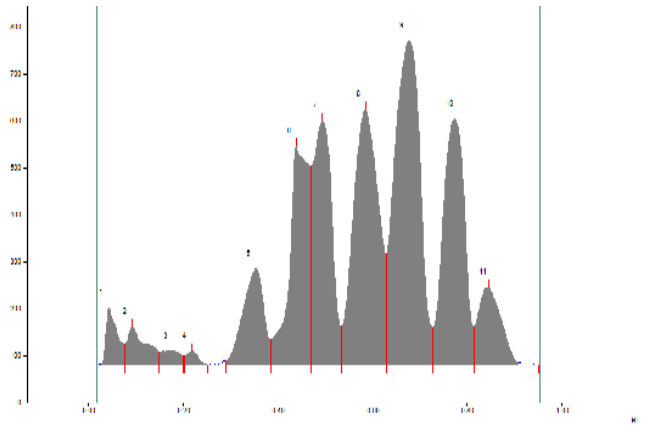
Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	2.1 AU	0.04 Rf	87.0 AU	2.62 %	0.08 Rf	11.9 AU	1246.8 AU	1.08 %
2	0.08 Rf	12.6 AU	0.09 Rf	19.9 AU	0.60 %	0.12 Rf	6.1 AU	271.7 AU	0.24 %
3	0.13 Rf	6.4 AU	0.14 Rf	18.8 AU	0.56 %	0.15 Rf	0.1 AU	135.5 AU	0.12 %
4	0.15 Rf	0.4 AU	0.23 Rf	34.0 AU	1.02 %	0.27 Rf	21.8 AU	1665.6 AU	1.44 %
5	0.28 Rf	22.0 AU	0.37 Rf	269.9 AU	8.11 %	0.41 Rf	21.1 AU	11766.2 AU	10.18 %
6	0.41 Rf	121.9 AU	0.44 Rf	449.3 AU	13.50 %	0.45 Rf	08.1 AU	8954.4 AU	7.75 %
7	0.46 Rf	408.1 AU	0.49 Rf	542.1 AU	16.29 %	0.53 Rf	68.7 AU	19281.8 AU	16.69 %
8	0.54 Rf	70.0 AU	0.59 Rf	507.3 AU	15.24 %	0.63 Rf	72.9 AU	20055.1 AU	17.36 %
9	0.63 Rf	276.2 AU	0.68 Rf	686.6 AU	20.63 %	0.72 Rf	87.5 AU	28509.2 AU	24.68 %
10	0.73 Rf	88.9 AU	0.77 Rf	552.3 AU	16.59 %	0.81 Rf	73.9 AU	18754.9 AU	16.23 %
11	0.81 Rf	76.7 AU	0.84 Rf	161.1 AU	4.84 %	0.90 Rf	0.1 AU	4896.3 AU	4.24 %

Unsaponifiable matter of *Daturaditaila* B1- 8µl



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	0.4 AU	0.04 Rf	112.1 AU	3.28 %	0.08 Rf	6.7 AU	1262.0 AU	1.08 %
2	0.08 Rf	6.7 AU	0.09 Rf	19.5 AU	0.57 %	0.11 Rf	9.3 AU	269.9 AU	0.23 %
3	0.11 Rf	9.5 AU	0.13 Rf	19.9 AU	0.58 %	0.15 Rf	16.2 AU	429.7 AU	0.37 %
4	0.15 Rf	16.4 AU	0.19 Rf	24.6 AU	0.72 %	0.21 Rf	9.7 AU	654.0 AU	0.56 %
5	0.23 Rf	8.7 AU	0.24 Rf	13.9 AU	0.41 %	0.28 Rf	0.5 AU	290.0 AU	0.25 %
6	0.28 Rf	1.2 AU	0.37 Rf	287.6 AU	8.42 %	0.41 Rf	01.7 AU	12065.7 AU	10.37 %
7	0.41 Rf	102.0 AU	0.44 Rf	476.6 AU	13.95 %	0.46 Rf	12.0 AU	9576.6 AU	8.23 %
8	0.46 Rf	412.2 AU	0.49 Rf	519.6 AU	15.21 %	0.53 Rf	69.5 AU	17815.7 AU	15.32 %
9	0.54 Rf	71.1 AU	0.58 Rf	531.3 AU	15.55 %	0.63 Rf	70.3 AU	20441.1 AU	17.57 %
10	0.63 Rf	272.7 AU	0.68 Rf	697.5 AU	20.41 %	0.72 Rf	99.3 AU	29201.6 AU	25.11 %
11	0.73 Rf	99.6 AU	0.77 Rf	551.5 AU	16.14 %	0.81 Rf	74.5 AU	19207.2 AU	16.51 %
12	0.81 Rf	76.8 AU	0.84 Rf	162.7 AU	4.76 %	0.90 Rf	0.2 AU	5103.2 AU	4.39 %

Unsaponifiable matter of *Daturaditaila*B2- 8µl



Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	0.9 AU	0.04 Rf	121.8 AU	3.61 %	0.08 Rf	44.9 AU	2125.4 AU	1.90 %
2	0.08 Rf	45.7 AU	0.09 Rf	82.0 AU	2.43 %	0.15 Rf	27.2 AU	2304.7 AU	2.06 %
3	0.15 Rf	27.4 AU	0.18 Rf	30.2 AU	0.89 %	0.20 Rf	19.4 AU	877.1 AU	0.78 %
4	0.20 Rf	19.5 AU	0.22 Rf	29.7 AU	0.88 %	0.25 Rf	0.1 AU	542.2 AU	0.49 %
5	0.29 Rf	9.2 AU	0.35 Rf	204.8 AU	6.07 %	0.39 Rf	54.5 AU	6497.2 AU	5.81 %
6	0.39 Rf	54.6 AU	0.44 Rf	465.4 AU	13.79 %	0.47 Rf	21.4 AU	13876.1 AU	12.42 %
7	0.47 Rf	422.1 AU	0.50 Rf	517.8 AU	15.34 %	0.54 Rf	82.0 AU	14718.8 AU	13.17 %
8	0.54 Rf	83.5 AU	0.59 Rf	544.0 AU	16.12 %	0.63 Rf	36.8 AU	21085.5 AU	18.87 %
9	0.63 Rf	240.5 AU	0.68 Rf	689.7 AU	20.44 %	0.73 Rf	79.1 AU	26880.4 AU	24.06 %
10	0.73 Rf	80.6 AU	0.78 Rf	523.3 AU	15.51 %	0.81 Rf	79.8 AU	17075.3 AU	15.28 %
11	0.82 Rf	80.7 AU	0.85 Rf	165.5 AU	4.90 %	0.91 Rf	4.4 AU	5756.8 AU	5.15 %

Unsaponifiable matter of *Daturaditaila* B3- 8µl

DISCUSSION

Dhutturapatradi Taila mentioned in *Sahasrayoga* is a popularly used product as hair oil in condition like *Indralupta*, *Kalithya* and *Darunaka*. In original reference the term *Taila* is used, in market *Kera Taila* processed in coconut oil and *Taila*, that is processed in sesame oil are available. Considering these aspect present study is planned. *Tila Taila and Narikela Taila* have different types of fatty acid composition, major content of *Tila Taila* is polyunsaturated fatty acid, were as *Narikela Taila* is composed of almost 92% of saturated fatty acid, out of which 70% are the medium chained triglycerides, hence it is expected that after processing with help of heat along with *Kalka* and *Dravadravya* both oil may show distinct difference in fatty acid composition and also incorporation of active principles, hence it was planned to evaluate *Dhutturadi Taila* by using two different media *Narikela Taila* and *Tila Taila.*

Analytical study

Analysis of test drug *Dhutturadi Kera Taila* and *Dhutturadi Taila* formed an important part of study. chief objective was to find out the difference in the physico-chemical parameters of oil sample prepared by using *Narikela Taila* and *Tila Taila*. Each *Taila* was prepared in 3 batches with similar condition and all sample were evaluated with advance analytic parameters to develop in house quality standards, this is very essential in process of standardization, so that standard operative procedure can be validated and quality of final product is issue. Initially the sample

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was tested for organoleptic characters. Organoleptic characters even though simple, highly informative and give an idea of basic quality of product. *Dhutturadi Kera Tailam* was golden yellowish in colour with characteristic odour of *Dhattura*. It had an oily consistency a change in colour due to incorporation of soluble particle from *Dhattura* into oil, the odour was agreeable.

Dhutturadi Taila was brownish yellow in colour and typical odour of *Tila Taila* was changed into a characteristic odour attributed of *Dhattura*. Change in colour of both oil may be due to change in colour of base oils (coconut oil was colourless and sesame oil was pale yellowish) and also may be due to slight difference in the extraction and incorporation of active principle of *Dhattura* into oils.

Loss on drying [14]

Loss on drying indicate the amount of moisture content in oil, if the moisture content is higher oil is always susceptible for rancidity. In case of *Dhutturadi Kera Taila* loss on drying was between 0.6 and 1% averaging 0.866% which is within acceptable limits. *Dhutturadi Taila* had a lower amount of moisture when compared with *Dhutturadi Kera Taila*, here loss on drying was from 0.1 to 0.24% with average of 0.166%

Viscosity

Viscosity is used to express the flow property of liquid, high the viscosity of liquid greater is the resistance for flow. In the preparation study viscosity of *Dhutturadi Kera Taila* was ranged between 38.6 and 39.4, formed an average 39 C.P, this is lower than normal average viscosity of coconut oil which is around 50.5 C.P, these may be due to effect of heat which removes some amount of hydroxyl group during reaction. These usually result in a reduction of viscosity, an increase in iodine value and change in refractive index.

Interestingly the situation was different in case of *Dhutturadi Taila*, here viscosity of samples ranged between 47.1 and 47.7 form an average of 47.5 which is higher than the normal viscosity of *Tila Taila*. It is about 35.3 C.P on an average. Usually that is considered reduction in viscosity facilitates better absorption.

Refractive index[15]

Refractive index of *Dhutturadi Kera Taila* samples showed refractive index of 1.4843 to 1.4876 with average of 1.4865, this is slightly more than average refractive index of coconut oil that is 1.4480 to 1.450. in case of *Dhutturadi Taila* samples refractive index was 1.4148 to 1.4149 which is lesser than normal refractive index of *Tila Taila*, that is ranging from 1.4645 to 1.4665 showing an opposite trend when compared with *Kera Taila* samples.

Refractive index depends upon number of factors like frequency of high temperature, physical stress etc. The effect of heat, change in colour due to absorption of active principle and also change in viscosity and fatty acid composition might have resulted in these change.

Iodine value[16]

Determination of iodine number is used in detecting quality of oil and also to know whether free from adulteration or not. Iodine value indicate the degree of unsaturation which in term denote the tendency for rancidity occurrence, more the iodine number more the unsaturated fatty acid bond present, these indicates that there are no number of double bond in oil which is more reactive , less stable and more susceptible for oxidation and rancidity. *Dhutturadi Kera Taila* samples showed an iodine value ranging from 22.84 to 25.38 averaging to about 24.533, in case of *Dhutturadi Taila* iodine value was between 76 and 76.1, these difference due to difference in type of fatty acid, *Narikela Taila* contains saturated fatty acid in more quantity were as *Tila Taila* contain unsaturated fatty acid in more amount, however iodine value in *Dhutturadi Kera Taila* was higher when compared with that of raw coconut oil, which ranges from 6.3 to 10.6, these is because heat treatment might have increase the degree of unsaturation forming no free fatty acid.

Resistance of coconut oil rancidity

Coconut oil has a high degree of saturation with a high content of saturated fatty acids because of high

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content of saturated fatty acid. Coconut oil is highly resistant to oxidative rancidity.

Saponification value[17]

Saponification indicate measure of fatty acid present as esters in the given oil ; it gives an idea about molecular weight of oils. Saponification number and molecular weight of oil are inversely proportional to each other thus a high saponification value indicate that oil is mainly composed of low molecular fatty acid and vice versa.

In our study it was found *Dhutturadi Taila* showed saponification value ranging from 189.5-199.8 (average 193.86) which is less than the normal range of saponification value for raw coconut oil (248-265). In case of *Dhutturadi Taila* also saponification value was reduced than that of raw *Tila Taila* (188-193) showing an average 134.962. This indicates that in both *Dhutturadi Kera Taila* and *Dhutturadi Taila* samples higher molecular fatty acid got generated.

Peroxide value[18]

Increase in peroxide value indicate the tendency of oil towards rancidity. In present study *Dhutturadi Kera Taila* showed a peroxide value of 6 in an average, which is quite within normal limit, upper limit 15 for coconut oil. *Dhutturadi Taila* samples showed a peroxide value ranging from 10-12, 10.66 on an average, in case of *Tila Taila* ideal upper limit of peroxide value is 10. Hence on comparison it looks that *Dhutturadi Kera Taila* samples are more stable and more resistant to rancidity.

Free fatty acid[19]

Dhutturadi Kera Taila shows free fatty acid content 1.98-2.18 on an average value of 2.046. *Dhutturadi Taila* showed an average free fatty acid of 7.446, this further indicate that amount of free fatty acid in *Dhutturadi Taila* is higher as indicated earlier by higher amount of acid value also. Earlier studies also have shown that heat used during process of *Taila Paka* can enhance acid value.

Test for rancidity[20]

All the test samples have tested for rancidity by krei's test, all the samples were negative for rancidity indicating that product were stable against oxidative rancidity. The test was performed at three intervals that is at end of third month, sixth month and eight month indicating good stability of all the test samples and resistance to rancidity, however an elaborative stability study including real time and accelerative stability data will prove to be more useful to arrive at a conclusion on stability of *Dhutturadi Kera Taila* and *Dhatturadi Taila.*

Chromatography[21]

Chromatograph is important tool and widely applied for standardization of herbal drugs, hence this technique was used for quality assessment of *Dhutturadi Kera Taila* and *Dhutturadi Taila*. Chromatograph study of poly herbal products has always remained a challenge, this is mainly because of multiple compounds present in product with different chemical nature. Selection of solvent for extraction, selection of proper mobile phase are very crucial and complicated, many a time these needs preliminary trials. The process is still difficult in case of *Snehakalpa*, as the separation of components becomes difficult and appropriate solvent is to be used for extraction. Multiple technique of visualisation are also to be followed as all the spots were not be visible in one method.

Hyocyamine an important alkaloid present in *Dhattura* was used as marker for comparison raw material, *Dhattura* leaves were also used. The product were subjected for HPTLC study for qualitative identification of marker hyocyamine in product and also to estimate the quantity densinometrically. Initially TLC was carried out, alcohol extract of *Dhattura* leaves and hyocyamine were used as standard for reference. Three sample of *Dhutturadi Kera Taila* and three samples of *Dhutturadi Taila* were subjected were subjected for TLC. Chloroform extract of unsaponifiable matter were spotted at quantity of 8 mm each, solvent system used was Chloroform: Methanol: Ammonia (85:14:1), after developing chromatograph visualization was done 1) Under short wave UV (254 nm), 2) Under long wave UV(366 nm), 3) After derivatisation with Dragendroff's reagent.

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Under short wave UV

Sample *Dhattura* leaves showed 7 green colour spots which were neither seen in hyocyamine nor in any samples. Spots with Rf value 0.67 (all dark green colour), spots with Rf value 0.92 (all light green colour) were seen only in B1, B2 and B3 samples. A spot with Rf value 0.48 (light green colour) was seen only in A2 sample of *Dhutturadi Kera Taila.* Spot of Rf value 0.59 (light green colour) were observed in sample A1 of *Dhutturadi Kera Taila* and all sample of *Dhutturadi Taila*. It seems that the spot seen only in *Dhutturadi Taila* samples are probably due to sesame oil itself from component like Sesaminol and may not be by *Dhattura*.[22-24]

Under long wave UV

7 spots with Rf value ranging from 0.09 to 0.88 were observed, in *Dhattura* sample only one spot with Rf value 0.28 was seen in hyocyamine in violet colour, sample spot was seen in pink colour in *Dhattura* but in none of other samples, a spot with Rf value o.4 in faint blue colour was seen in A3 sample of *Dhutturadi Kera Taila* and all sample of *Dhutturadi Taila*. A faint blue colour with Rf value 0.43,0.610.69 were seen only in *Taila* samples (B1,B2 and B3) similarly a brown spot with Rf value 0.65 was seen only in *Dhutturadi Taila* samples. A spot with Rf value 0.54 and 0.88 were seen in all sample except hyocyamine, this must be due to some other component than hyocyamine.

A spot with faint green colour with Rf value 0.67 was seen only in A1 and A2 sample of *Kera Taila*, a spot which is faint green colour of Rf value 0.73 could be visualized only in sample A3 of *Kera Taila*, a faint blue colour with Rf value 0.96 could be seen in two *Kera Taila* samples A2, A3 and all *Taila* samples. The details are depicted in table 13, 14, 15 and figure 1, 2, 3, 4.

After derivatisation with Dragendroff's reagent

Extract of *Dhattura* show 12 spots with Rf ranging from 0.04-0.89. Two purple colour spot with Rf value 0.28-0.42 could be seen in all sample due to hyocyamine which confirm the presence of hyocyamine in *Dhattura* and all 6 samples.

A purple coloured spot of Rf 0.31 and blue spot with Rf 0.74 were seen in all sample except *Dhattura* and hyocyamine. A brown spot in the Rf value 0.09 seen in *Dhattura* and sample, spot visible in all sample but with blue colour, this is probably a compound other than hyocyamine in *Dhattura*, similarly a purple coloured spot with Rf 0.14 was seen in *Dhattura* and all 6 sample of *Kera* and *Taila*. A pink coloured spot with Rf value 0.66 appear in sample A1 and all the *Dhutturadi Taila* samples. In sample A2 same spot with Rf 0.66 was seen but the colour was green.

An HPTLC study was carried out by using samples same as described in TLC, here the plate was developed in Toluene – Ethyl acetate (9:1) and developed plate were visualized under UV 254-366 nm and after derivatisation in vanillin-sulphuric acid spray reagent. Post derivatisation Rf value and colour of spots were recorded and densinometric evaluation was done for quantitative estimation.

Under 254 nm hyocyamine showed maximum area under curve AUC of 90.12% at an Rf maximum of 0.03, these hyocyamine was detect at Rf of 0.04 in all sample including *Dhattura* under long term view, same Rf value of 0.03 was seen for hyocyamine covering an area of 94.29% same compound was seen in all sample including *Dhattura*, Rf was slightly changed as 0.04, after derivatisation this particular peak was greatly reduced in all sample including hyocyamine. Percentage of hyocyamine in the samples may be calculated by formula

$$\frac{\text{AUC of sample} \times \text{Concentration of standard}}{\text{AUC of standard} \times \text{Concentration of sample}} \times 100$$

When calculated accordingly under short term UV and average hyocyamine content in *Narikela Taila* sample was found to be 1.7553% and in *Taila* samples are 4.726% *Tila Taila* processed product showed some other major peaks also which are not identified, similarly unidentified peaks are also seen in *Kera Taila* samples.

Further detailed analysis by using multiple marker compounds and different solvent system may be required to get more information and arrive at conclusion. As per the existing result it seems that

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more amount of marker components are extracted into *Tila Taila* medium when compared with *Narikela Taila*.

CONCLUSION

Formulation *Dhutturadi Taila* mentioned in *Sahasrayoga* was taken for present study. *Dhutturadi Taila* mentioned in *Sahasrayoga* is a popularly used product as hair oil in condition like *Indralupta, Kalithya* and *Darunaka*. In original reference the term *Taila* is used, in market *Kera Taila* processed in coconut oil and *Taila*, that is processed in sesame oil are available. Considering this aspect present study is planned. *Tila Taila* and *Narikela Taila* have different types of fatty acid composition, major content of *Tila Taila* is polyunsaturated fatty acid, were as *Narikela Taila* is composed of almost 92% of saturated fatty acid, out of which 70% are the medium chained triglycerides, hence it is expected that after processing with help of heat along with *Kalka* and *Drava Dravya* both oil may show distinct difference in fatty acid composition and also incorporation of active principles, hence it was planned to evaluate *Dhutturadi Taila* by using two different media *Narikelataila* and *Tilataila*, Chief objective of study was to comparative evaluate *Dhutturadi Taila* sample prepared in *Tila Taila* and *Narikela Taila* as per standard operative procedure, even though there has been several study of *Sneha Kalpana*, these kind of study is a new attempt and of considerable pharmaceutical and clinical importance.

Formulation *Dhutturadi Taila* was prepared by using *Tila Taila* and *Narikela Taila* as bases under similar conditions, development of standard operative procedure was important objective of study hence to have uniform and batch to batch quality assurance 3 samples of *Dhutturadi Taila* were prepared in each category of *Tila Taila* and *Narikela Taila* as base. Each and every step in preparation was keenly observed and monitored to get reliable results. It is interesting to note that even though *Narikela Taila* contain more fatty acid and *Tila Taila* contain poly unsaturated fatty acid *Sneha Siddha Lakshana* were similar with a higher amount of foam in case of *Tila Taila*, which is due to the highest amount of polyunsaturated fatty acid in *Tila Taila* resulting in continuous oxidation. *Paka* was completed at *Madhyamapaka* level. In case of *Narikela Taila* a loss of 4.29% on an average was observed among 3 samples, the loss was slightly higher that is 5.59% in case of *Tila Taila*, in total the yield was quite good and within normal limit in both *Narikela Taila* and *Tila Taila* samples. The process was well controlled and 3 samples in each group showed very similar observation throughout process. Hyocyamine an important alkaloid present in *Dhattura* was used as marker for comparison raw material, *Dhattura* leaves were also used. The product were subjected for HPTLC study for qualitative identification of marker hyocyamine in product and also to estimate the quantity densinometrically. When calculated under short term UV and average hyocyamine content in *Narikela Taila* sample was found to be 1.7553% and in *Taila* samples are 4.726%.

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