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Pharmaceutico-Analytical Study of A Polyherbal Ayurvedic Formulation *BhallatakaadiTaila* Indicated in *DadruKushta*

Author: Rekha Patil[1]

Co Authors: Shrinidhi R[2], Chaithra Hebbar[3], Muralidhar Ballal[4] and Suchitra N Prabhu[5]

[1-3]Dept. of P.G. Studies in *Agadatantra*, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Kuthpady, Udupi-574118, Karnataka, India
[4]Dept. Of P.G. Studies in *Rasashastra & Bhaishajya Kalpana*, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Kuthpady, Udupi-574118, Karnataka, India
[5]Pharmacognosy and Phytochemistry,Sri Dharmasthala Manjunatheshwara Centre For Research In Ayurveda And Allied Sciences, Kuthpady, Udupi-574118, KA, India

ABSTRACT

Skin conditions pose significant threat for the person's well-being, mental health, ability to function and social participation. Global Burden of Disease project, has shown that skin diseases are the 4th leading cause of non-fatal disease burden world-wide[1]. Superficial fungal infections contribute huge part among the commonly seen dermatological disorders. Worldwide prevalence of Dermatophytosis is about 20000-25000 individuals per 100000, whereas incidence ranges from a low of 10000 per 100000 persons to a high of 15000 per 100000 persons. It is predominance in about 20-25% of the world population. In India, according to recent study prevalence ranges from 36.6-78.4%. One of the reasons for concern is its unresponsiveness to treatment in majority of the cases and the early recurrence. The new drugs have to be discovered and tried in this disease. *Bhallatakaadi Taila*isone of the unutilized new formulations, indicated in the *Dadru Kushta* for *Bahya Parimarjana Chikitsa*, as *Abhyanjana*. It has 14 different ingredients among which *Bhallataka* and *Gunja* are *Upavisha Dravya*. Other ingredients include, *Aksha, Kushta, Triphala, Trikatu, Panchalavana*. The method of preparation adopted was general *Sneha Kalpana Vidhi* as per *Sharangadhara Samhita*. This study is about pharmaceutico-analytical standardization of *Bhallatakaadi Taila*.

Key Words*Bhallataka, Bhallatakaadi Taila, Dadru Kushta, Gunja, Pharmaceutico-Analytical study*

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INTRODUCTION

Ayurveda, being the deposit of many unexcavated therapeutics, has various formulations which can be used for treatment of *Dadru*that has similar presentation with dermatophytosis. Superficial fungal infections contribute huge part among the commonly seen dermatological disorders. Worldwide prevalence of dermatophytosis is about 20000-25000 individuals per 100000, whereas incidence ranges

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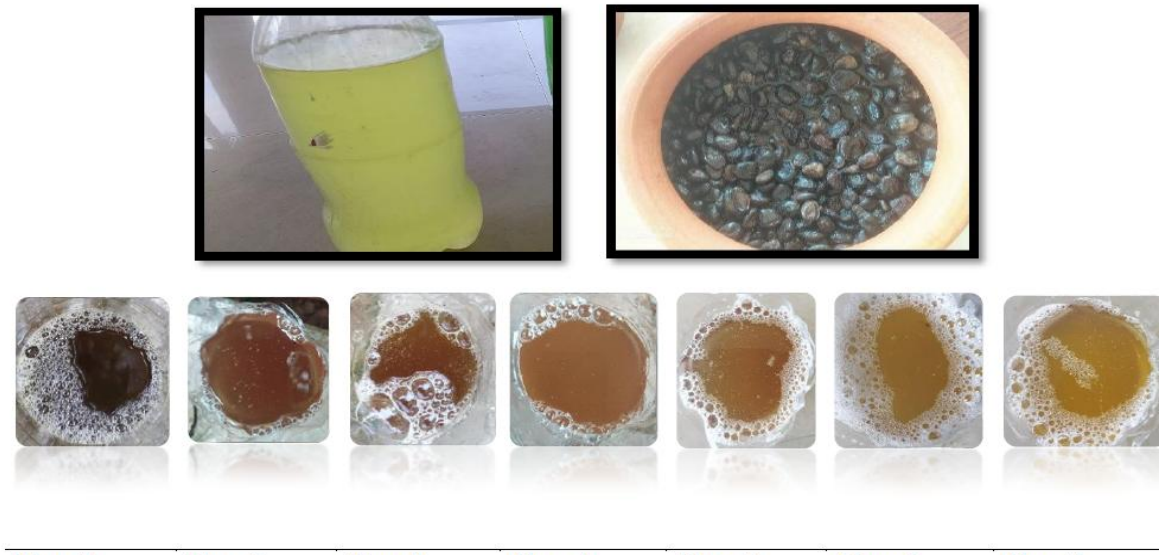
Step 1; *Jala Nimajjana*

Step 2; *Gomutra Sthapana*



Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7

Step 3; *Goksheera Sthapana*

Step 4; *Ishtika Choorna /Gharshana*

Figure 1 *Shodhana* of *Bhallataka*

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Table 1 Ingredients used are;

DRUGS REQUIRED	BOTANICAL NAME	PART USED	QUANTITY
Bhallataka	Semicarpus anacardium	Seeds	5.1428 kg
Maricha	Piper nigrum	Seeds	1.7144 kg
Shunti	Zingiber officinale	Rhizome	1.7144 kg
Pippali	Piper longum	Seeds	1.7144 kg
Aksha (Bhibhitaki)	Terminalia bellarica	Fruit	6.8572 kg
Kushta	Saussurealappa	Whole plant	5.1428 kg
Gunja	Abrus precautarius	Seeds	5.1428 kg
Panchalavana (Saindhava, Sauvarchala, Saamudhra, Vida, Romaka)	-	-	Each 1.02828 kg
Haritaki	Terminalia chebula	Fruit	1.7144 kg
Amalaki	Phyllanthus emblica	Fruit	1.7144 kg
Amoorchita Tila Taila	-	-	16 liters

from 10000 to 15000 per 100000 persons. It is predominant in about 20-25% of the world population[1]. In India, according to recent survey prevalence ranges from 36.6-78.4%[2]. Over the last few decades, the frequency of the cases has increased alarmingly constituting at least 5-10% of cases showcasing in dermatology OPD.*Sneha Kalpana* holds an important place, amidst the various dosage forms of external medications. Advantages of *Sneha Kalpana*areamplifiedsustainable absorption, longer bioavailability of medicaments and extraction of fat soluble as well as a water-soluble active principle at a time in a single formulation.*Bhallatakaadi Taila* is the polyherbal formulation selected from Harita Samhita[3], indicated in *Dadru Kushta* for *Abyanjana*. It has 14 ingredients viz., *Bhallataka, Gunja, Aksha, Kushta, Triphala, Vyosha, Panchalavana.*Among these *Bhallataka* and *Gunja* are*Upavisha*[4].The*Teekshna, Ushna Guna* of the *Taila* acts as counter irritant against the dermatophytes.The present study aims to focus on the pharmaceutico-analytical study of *Bhallatakaadi Taila* with various parameters.

AIMS AND OBJECTIVES

Pharmaceutical and Analytical profiling of *Bhallatakaadi Taila*.

MATERIALS AND METHODS

The *Taila* was prepared in the S.D.M Ayurveda Pharmacy, Kuthpady, Udupi. The drug *Bhallataka* was procured from pharmacy and *Shodhana*was done by method mentioned in API. After *Shodhana,Taila* was prepared in S.D.M. Pharmacy.

A. Pharmaceutical study;

A.1. *Shodhana*of*Bhallataka*;

The nuts were introduced to the process of *Jala Nimmajjana*[4]and those which soak in water were selected for the preparation of the oil. Thenuts were subjected to*GomutraSthapana* for 7 consecutive days, each day the *Mutra* was replaced. After 7th day they were washed and subjected to *GoksheeraSthapana* for 7

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consecutive days, replacing the *Ksheera* for 7 days. On 14th day nuts were washed and dried. Followed by *IshtikaChoorna Gharshana*[5]for one day to remove the remaining vesicants. Further, nuts were washed and dried for *Taila* preparation. Various processing steps of *Bhallataka Shodhana* is depicted in Figure No.-01.

Oil was prepared by the reference of *Taila Paaka Vidhi*as mentioned in *SharangdharaSamhitaMadhyama Khanda*[6]. The ingredients and quantity of the raw drugs used in the *Taila* is mentioned in Table No.-01.

*Kalka*was prepared byusing drugs such as *Shodhita Bhallataka, Gunja, Triphala, Vyosha, Panchalavana, Kushta.* One part of*Kalka*, 4 parts of *Tila Taila*and 16 parts of *Kashaya*wereheated on mild flame until the *Taila Siddhi Lakshana* was obtained. *Sneha Siddhi Pariksha* was done to check if any water content was left in the *Taila*.As per the classics the *Khara Paka* was done, as it was for external application[7]. The process of preparation of *Bhallatakaadi Taila* is shown in Figure No.-02. The Rasa-panchaka of the drugs are mentioned in Table No.-02 and Table No.-03 explains regarding the observations made during the preparation of *Taila.*

B. Analytical Study of *Bhallatakaadi taila*.

Organoleptic characters and Physio-chemical parameters- Refractive index, Specific gravity, Viscosity, Acid value, Saponification value, Iodine value, saponification value, Unsaponifiable matter, Peroxide value and HPTLC.

Figure 2 Preparation of *Bhallatakaadi Taila*

Table 2 *Rasa-panchaka* of the drugs

Sl No	Drug	Rasa	Guna	Vipaka	Virya	Karma	Doshagnata
1.	*Bhallataka*[8]	*Katu Tikta Kashaya*	*Teekshna Laghu Snigdha*	*Madhura*	*Ushna*	*Kushtagna, Arshoghna, Deepani, Bhedani, Mutra-Sangrahana*	*Kaphavata Shamaka*
2.	*Gunja*[8]	*Tikta, Kashaya*	*Laghu, Ruksha, Tikshna*	*Katu*	*Ushna*	*Keshya*	*Kaphavata Shamaka*
3.	*Kushta*[8]	*Katu, Tikta, Madhura*	*Laghu Rooksha Teekshna*	*Katu*	*Ushna*	*Sukrala, Kushtaghna Lekhaneeya,*	*Vata – Kapha Shamaka*

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						Vrshya	
4	*Shunti*[8]	*Katu*	*Guru, Rooksha, Teekshna*	*Madhura*	*Ushna*	*Deepana, Bhedana*	*Vata-Kaphahara*
5	*Maricha*[8]	*Katu, Tikta*	*Teekshna, Rooksha*	*Madhura*	*Naatyushna*	*Deepana, Avrshya, Pramathi*	*Kaphavatahara*
6	*Pippali*[8]	*Katu*	*Snigdha, Laghu*	*Madhura*	*Anushna*	*Deepana, Rasayana, Pachana*	*Vata-Shleshmahari*
7.	*Pathya*[8]	*Kashaya*	*Ruksha Laghu*	*Madhura*	*Usna*	*Anulomani, Deepana, Pachana, Rasayana*	*Tridoshahara*
8.	*Amalaki*[8]	*Amla*	*Ruksha Laghu*	*Madhura*	*Sita*	*Vrishya, Rasayana, Jwarahara, Raktapittagna*	*Tridosha Shamaka*
9.	*Vibhitaki*[8]	*Kashaya*	*Ruksha Laghu*	*Madhura*	*Usna*	*Bhedana, Kasahara, Krimighna, Netrya*	*Tridoshahara*
10.	*Saindhava Lavana*[9]	*Lavana, Madhura ,*	*Laghu, Snigdha, Sukshma*	*Madhura*	*Sheeta*	*Deepana, Pachana, Ruchya, Vrishya, Nethrya*	*Tridoshahrt*
11.	*Sauvarchala Lavana*[9]	*Lavana*	*Snigdha Laghu Vishada*	*Madhura*	*Ushna*	*Rochana, Hridya,Bhedana, Deepana, Pachana*	*Vatanuth, Pittala*
12.	*Vida*[9]	*Lavana*	*Laghu Ruksha Vyavayi Teekshna*	*Madhura*	*Ushna*	*Deepana Ruchya*	*Kapha Vata -Anulomana*
13.	*Romaka*[9]	*Madhura*	*Laghu Teekshna Sukshma*	*Katu*	*Ushna*	*Bhedi Abhish -yandhi*	*Vataghna Pittala*
14.	*Saamudhra Lavana*[9]	*Madhura Katu Lavana*	*Guru Snigdha*	*Madhura Katu*	*Ushna*	*Deepana Bhedi Saksharam Vidahi*	*Shleshmala Vatanut*

Table 3 Observations made during preparation of *Bhallatakaadi Taila;*

Sl. No.	Observation Parameters	Observations
1.	Total quantity of *Kalka* taken	4 kg
2.	Total quantity of *Kwatha*taken	64 litres
3.	Quantity of oil	16 litres
4.	Temperature of oil during addition of *Kalka*	90 ^{0}C
5.	Temperature of oil during adding of *Kwatha*	85 ^{0}C
6.	Average temperature Day 1	101 ^{0}C
7.	Average temperature Day 2	100 ^{0}C

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8.	Average temperature Day 3	100 ^{0}C
9.	Average temperature Day 4	98 ^{0}C
10.	Duration of Heating Day 1	4 hours
11.	Duration of Heating Day 2	3 hours 30 minutes
12.	Duration of Heating Day 3	4 hours
13.	Duration of Heating Day 4	4 hours 30 minutes
14.	Total duration of heating	15 hours
15.	Obtained quantity	15.2 litres
16.	Weight loss	0.8 litre
17.	% Weight loss	5%
18.	Temperature during filtration	37 ^{0}C

Organoleptic Characteristics of *Bhallatakaadi Taila*-

Colour – Blackish brown

Touch- Smooth

Taste –not applicable

Appearance – Translucent

Clarity – not clear

Smell – Pungent smell

B.1. Methodology

The following parameters were calculated using the standard procedures.

B.1a. Refractive index[10]

B.1b.Specific gravity[10]

B.1c. Viscosity[10]

B.1d. Acid value[10]

B.1e. Saponification value[10]

B.1f. Iodine value[10]

B.1g. Determination of Unsaponifiable matter[10]

B.1h. Peroxide value[10]

B.1i. Sample preparation for HPTLC[10]

Sample obtained in the procedure for the determination of unsaponifiable matter was dissolved in 10 ml of chloroform this was followed for the sample of *Bhallatakaadi Taila*, and chloroform soluble portion was used for HPTLC.

HPTLC:[11,12,13]

Aluminium plates were applied with the samples of 3, 6, 9µl of the chloroform fraction of *Bhallatakaadi Taila*to a band width of 8mm using Linomat 5 TLC applicator. Double trough chamber CAMAG in a solvent system Toluene – Ethyl acetate (9:1) was used to develop the plates which were visualized under short UV, long UV and after derivatisation in vanillin-sulphuric acid spraying reagent. And scanned under UV 254nm, 366nm and 620nm (Post derivatisation). R_f, colour of the spots and densitometric scan were recorded.

Table 4 Results of standardization parameters for *Bhallatakaadi Taila*

Parameter	**Results *n = 3***
	Bhallatakaadi taila
Refractive index	1.33217
Specific gravity	0.4091
Viscosity	39.38
Acid value	137.5
Saponification value	140.93
Iodine value	97.29
Unsaponifiable matter (%w/w)	4.40
Peroxide value	1.2

OBSERVATIONS AND RESULTS

The results of analytical study of the *Bhallatakaadi Taila*are mentioned in the Table No.-04.The R_f values of the HPTLC scan are explained in the Table No.-05.The HPTLC photo documentation results are depicted in Figure No.-

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03. And Figure No.-04 shows the densitometric scan of the study drug.

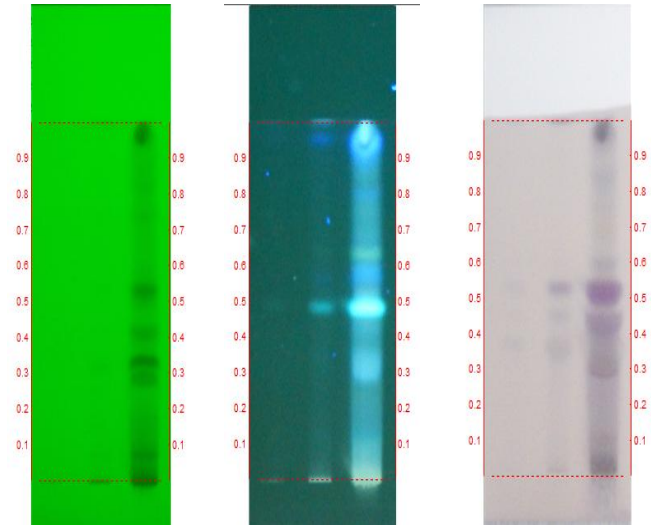
Table 5 R_f values of *Bhallatakaadi Taila*

Short UV	Long UV	Post derivatisation
0.08 (Green)	-	-
-	-	0.11 (Purple)
0.30 (Green)	-	0.30 (Purple)
0.34 (Green)	0.34 (F. blue)	-
0.42 (Green)		0.42 (Purple)
-	0.48 (F. blue)	-
0.54 (Green)	-	0.54 (Purple)
0.59 (Green)	0.59 (F. blue)	0.59 (Purple)
-	0.63 (F. green)	-
0.74 (Green)	-	-
-	0.80 (F. blue)	-
0.84 (Green)	-	0.84 (Purple)
0.88 (Green)	-	-
-	0.96 (F. blue)	-

***F- fluorescent**

B.3. Remarks

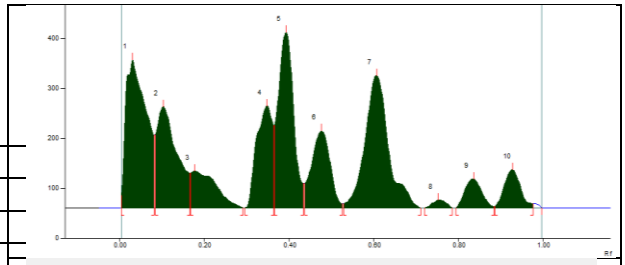
The given sample of ***Bhallatakaadi Taila***has been standardized as per standard testing protocol. The results of standardization parameters and HPTLC Photo-documentation, R_f values and Densitometric scan are given in respective tables and figures.



Short UV Long UV Post derivatisation

Solvent system - Toluene: Ethyl acetate (9.0:1.0)
Track 1 – *Bhallatakaadi taila* – 3µl
Track 2 – *Bhallatakaadi taila* – 6µl
Track 3 – *Bhallatakaadi taila* – 9µl

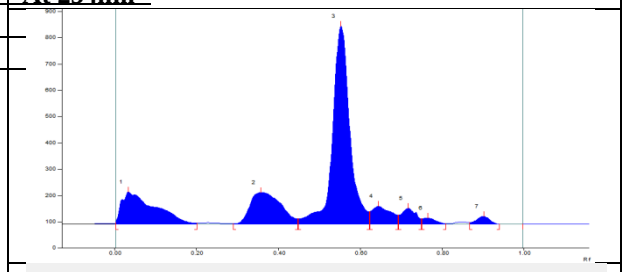
Figure 3: HPTLC photo documentation of chloroform fraction of *Bhallatakaadi Taila*



Track 3, ID: Ballatakadi taila

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	24.5 AU	0.03 Rf	296.0 AU	17.44 %	0.08 Rf	45.4 AU	10381.0 AU	18.88 %
2	0.08 Rf	145.9 AU	0.10 Rf	202.7 AU	11.94 %	0.17 Rf	69.6 AU	7034.8 AU	12.80 %
3	0.17 Rf	69.7 AU	0.18 Rf	73.4 AU	4.32 %	0.29 Rf	0.3 AU	3160.1 AU	5.75 %
4	0.30 Rf	0.2 AU	0.35 Rf	204.4 AU	12.04 %	0.36 Rf	64.4 AU	5479.6 AU	9.97 %
5	0.37 Rf	165.3 AU	0.39 Rf	351.8 AU	20.72 %	0.44 Rf	48.9 AU	9251.3 AU	16.83 %
6	0.44 Rf	49.4 AU	0.48 Rf	154.2 AU	9.08 %	0.53 Rf	8.4 AU	4898.9 AU	8.91 %
7	0.53 Rf	8.6 AU	0.61 Rf	264.3 AU	15.57 %	0.71 Rf	0.2 AU	10593.8 AU	19.27 %
8	0.72 Rf	0.1 AU	0.75 Rf	15.9 AU	0.94 %	0.79 Rf	0.1 AU	367.4 AU	0.67 %
9	0.80 Rf	0.4 AU	0.84 Rf	58.5 AU	3.44 %	0.89 Rf	2.8 AU	1681.4 AU	3.06 %
10	0.89 Rf	3.3 AU	0.93 Rf	76.3 AU	4.49 %	0.98 Rf	8.8 AU	2122.3 AU	3.86 %

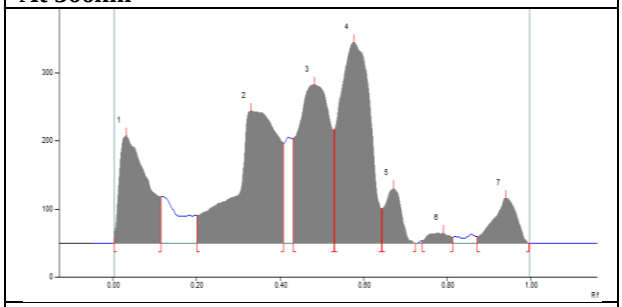
At 254nm



Track 3, ID: Ballatakadi taila

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	7.2 AU	0.03 Rf	122.4 AU	10.42 %	0.20 Rf	3.6 AU	7117.2 AU	17.12 %
2	0.29 Rf	1.6 AU	0.36 Rf	119.6 AU	10.18 %	0.45 Rf	20.2 AU	6539.0 AU	15.73 %
3	0.45 Rf	20.3 AU	0.55 Rf	752.7 AU	64.04 %	0.62 Rf	47.5 AU	22889.5 AU	55.05 %
4	0.62 Rf	47.8 AU	0.65 Rf	67.7 AU	5.76 %	0.69 Rf	34.1 AU	2300.6 AU	5.53 %
5	0.70 Rf	34.3 AU	0.72 Rf	60.5 AU	5.15 %	0.75 Rf	20.2 AU	1523.2 AU	3.66 %
6	0.75 Rf	20.3 AU	0.77 Rf	23.3 AU	1.98 %	0.81 Rf	2.2 AU	534.0 AU	1.28 %
7	0.87 Rf	6.0 AU	0.90 Rf	29.1 AU	2.48 %	0.94 Rf	0.0 AU	678.8 AU	1.63 %

At 366nm



Track 3, ID: Ballatakadi taila

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.00 Rf	7.5 AU	0.03 Rf	157.9 AU	15.22 %	0.11 Rf	67.9 AU	7380.3 AU	13.43 %
2	0.20 Rf	40.7 AU	0.33 Rf	193.2 AU	18.62 %	0.41 Rf	46.7 AU	14545.9 AU	26.48 %
3	0.43 Rf	154.1 AU	0.48 Rf	232.1 AU	22.37 %	0.53 Rf	66.2 AU	12339.6 AU	22.46 %
4	0.53 Rf	166.9 AU	0.58 Rf	293.7 AU	28.31 %	0.64 Rf	50.3 AU	15256.0 AU	27.77 %
5	0.65 Rf	50.4 AU	0.67 Rf	80.0 AU	7.71 %	0.73 Rf	0.1 AU	2234.3 AU	4.07 %
6	0.74 Rf	3.3 AU	0.79 Rf	14.4 AU	1.39 %	0.81 Rf	9.1 AU	538.3 AU	0.98 %
7	0.87 Rf	9.6 AU	0.94 Rf	66.2 AU	6.38 %	1.00 Rf	0.0 AU	2643.4 AU	4.81 %

At 620nm

Figure 4 Densitometric scan of Chloroform fraction of *Bhallatakaadi Taila*

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DISCUSSION

*Semecarpus anacardium Linn.*is an organic irritant toxic drug which may induce hypersensitivity in certain individuals, a compulsory processing step *Shodhana*is conducted to control its default irritant property.*Dadru* is a *Kshudra/Maha Kushta* manifested predominantly by vitiated *Pitta-Kapha Dosha*. The ingredients in *Bhallatakaadi Taila* such as viz.,*Bhallataka, Kushta, Gunja, Trikatu, Triphala, Panchalavana* alleviates the *Dosha* and helps in mitigating the *Lakshana*. Clinical features of *Dadru Kushta* simulating with Dermatophytosis is caused due to the growth of fungal species on superficial layer of skin. The irritant drugs like *Bhallataka* and *Gunja*, act as counter irritants in the superficial mycoses in the dermatophytosis**.**

Refractive index indicates the possible chances of rancidity in duecourse of time in the oil. Higher is the refractive index, higher is the chances of spoilage due to oxidation. Specific gravity of the oil indicates the weight per ml of oil. This helps in the dosefixation of the medication, as 5 ml of *Bhallatakaadi Taila* contains 2.0455 g of the oil. Viscosity is the resistance to flow in a liquid. As the viscosity of the oil is increased the duration of oil retained in the body for absorption is longer. The oil is stored in adipose tissue prior to get released into the blood stream.Acid value is the relative measure of rancidity as free fatty acids are normally formed during decomposition of triglyceride esters into glycerol and fatty acids. Higher is the acid value higher is the rancidity. Saponification valueindicates the components of the fatty substances which are capable of forming soaps when treated with alkali. Unsaponifiable matter includes non-volatile components such as alkanes, sterols etc, also this fraction may involve environmental contaminants and residues such as plasticizers, pesticides, mineral oil hydrocarbons and aromatics. Iodine value determines the amount of unsaturation in oil, mainly due to double bonds which are reactive towards halogens. Higher is the iodine value, more is the unsaturation in the oil.

HPTLC plates when observed under short UV showed 6 bands with different intensity of green. Under long UV it showed 6 bands (all fluorescent blue). Post derivatization with spraying reagent VSA reagent it showed 6 bands (all purple). Densitometric scan at 254 nm showed 10 peaks, among which R_f 0.61 (19.27%) was the major peak. At 366 nm R_f 0.55 (55.05%) was the major constituent. Post derivatization when scanned at 620 nm it showed 3 peaks with absorption around average 25% area namely at R_f 0.58 (27.77%), R_f 0.33 (26.48 %), R_f 0.48 (22.46%) were the majorly identified possible constituents of *Bhallatakaadi Taila.*

CONCLUSION

*Bhallatakaadi Taila*having*Dadrugna* property is been standardised pharmaceutically and analytically,being a novel formulation, which was not been standardised in the recent past, was

found pharmaceutically viable and could be carried further for clinical intervention but the safety aspect should be monitored. Further a patch test can be performed to rule-out any adverse drug reaction in sensitive patient population.

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