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Standardization of *Gunja Taila*

Jitendra Meena[1], Mohar Pal Meena[2],Subhash Chand Yadav[3], Dhan Raj Bairwa[4], Nakhat Mal[5]

1. MD Scholar, Dept. Rasa shastra and Bhaishajya kalpana, NIA, Deemed to be University, Jaipur, (Raj.)
2. Associate Professor, Dept. Rasa shastra and Bhaishajya kalpana, NIA, Deemed to be University, Jaipur, (Raj.)
3. Phytochemist, Dept. Rasa shastra and Bhaishajya kalpana, NIA, Deemed to be University, Jaipur, (Raj.)
4. BAMS MD, Assistant Professor, Dept. Rasa shastra and Bhaishajya kalpana, Kalawati Ayurveda Medical College & Hospital, Kasganj, Gorha, (UP.)
5. MD Scholar, Dept. Rasa shastra and Bhaishajya kalpana, NIA, Deemed to be University, Jaipur, (Raj.).

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Corresponding author-
Jitendra Meena, MD Scholar, Dept. Rasa shastra and Bhaishajya kalpana, NIA, Deemed to be University, Jaipur, (Raj.)

Email
drjitendrameena86@gmail.com

ABSTRACT:

Sneha kalpana is one of the unique and commonly prescribed *Ayurvedic* dosage form in day-to-day practice having increase potency, palatability, shelf life etc. Although varities of *Snehas* are described in *Ayurvedic* texts, the most common amongst them are *Taila* & *Ghrita kalpana*. The research work entitled "***Standardization of Gunja Taila***" was planned to standardize two formulations as per the reference of *Chakradatta* and *Bhaishajya Ratnavali*. Therefore, two samples of *Gunja Taila* with their three batches each, were prepared with their conceptual references. Both the samples were analyzed based on Organoleptic Parameters, i.e., Appearance, Colour, Odour, Touch, etc. and Physico-chemical Parameters i.e., Foreign Matter, Specific gravity, Saponification Value, Peroxide Value, Baudouin's Test, Mineral oil Test, Viscosity, Total fatty Matter, Refractive Index, Brix Value, Rancidity, Optical Rotation, Acid Value, Iodine Value. The findings for these parameters were found to be satisfactory for quality assurance. Assay of heavy metals (Pb, Cd, As, Hg), Total bacterial count and Total fungal count are under the permissible limit depicted in the study. Specific pathogens and aflatoxins (B1, B2, G1, G2) are absent in all samples. HPTLC is an important tool to generate the standardization parameter for quality control purpose. Sample GT-1 and GT-2 were analysed on different wavelengths 510 nm, 366 nm (Long) & 254 nm (Short). It confirmed 11 distinct spots at 510 nm, 06 distinct spots at 366 nm and 12 spots at 254 nm of GT-1 samples whereas 12 distinct spots at 510 nm, 06 distinct spots at 366 nm and 12 spots at 254 nm were observed in GT-2 samples. The Rf values of spots differentiate the chemical composition of the sample.

Keywords: *Sneha Kalpana, Mridu, Maddhya, Khara, Drava Dravya, Gunja Taila, G.T-1, G.T-2, Rf Values*

INTRODUCTION

Ayurveda the science of life, uses natural resources to fulfill the fundamental objectives i.e., *Swasthya Rakshana* and *Vikar Prashamana*.[1] *Ayurveda* has given greatest emphasis to comprehensive knowledge of drugs. This science of manufacturing drugs is classified under two branches as *Rasa Shastra* & *Bhaishajya Kalpana*. *Bhaishajya kalpana* is a branch dealing with formulations mainly of herbal origin. *Panchavidha kashaya kalpana* such as *Swarasa, Kalka, Kwatha, Hima* & *Phanta* are the basic pharamaceutical preparations described in *Ayurvedic*

Pharmaceutics and used since ancient times in some or other form to treat various diseases. Thus, in this way they are serving to human species and also fulfilling the aim of *Ayurveda* to keep human being healthy. The drug having quality to produce *Arogya* is the best drug as per ancient *Acharya*.[2] Keeping this view in the mind a number of preparations known as secondary *kalpanas* have been derived from these five basic preparations e.g., *Asavarishta, Lepa, Churna, Vati, Sneha kalpana* etc.

Sneha kalpana is one of the unique and commonly prescribed *Ayurvedic* dosage form in day-to-day practice having increase potency, palatability, shelf life etc. *Sneha Siddha* (fat soluble) drugs have better pharmacokinetic action in comparison to other dosage forms, because the use of *Taila* base is presumably to extract or hold lipid soluble active ingredients from the herbal drugs used and these lipid soluble substances readily permeate into the bio membrane of cells due to its lipid nature.

Contemplation of ancient literature reveals that *Taila* are predominately used for internal and external application. Although, *Acharyas* were fully conscious of the standards for quality and shelf-life of Ayurvedic formulations and quality control such as *Sneha Siddhi Pareeksha*[3] have been described in ancient texts. *GunjaTaila* is the example of *Sneha Kalpana*. On The basis of ample literary evidences there are many formulations available for *Gunja Taila* as per different ayurvedic treatise. *GunjaTaila* is mentioned in *Chakradatta*[4], *Bhavprakash*[5], *Yogaratnakara*[6], *Bhaishajya Ratnavali*[7], *YogaTarangni*[8], *RasaTarangni, Vrindamadhava, Vangsena* etc as shown in table no.1. The research work entitled "***Standardization of Gunja Taila***" planned to standardize two formulations as per the reference of *Chakradatta* and *Bhaishajya Ratnavali* as given below.

1) ***Chakradatta***

As per Table no.2, Acharya mentioned that *TilaTaila* when performed *Sneha paka* with *Gunja phala kalka &Bhringraja swarasa*, *GunjaTaila* is obtained. It is used to treat *Kandu, Kushtha, Darunaka Kapalaroga*.

2) *Bhaishajya Ratnavali*

As per Table no.3, *MurchchhitaTilaTaila, Kanji, Bhringraja swarasa* (each 4 *Pala*) and *Gunja Churna kalka* 2 *pala* are heated mild for *Taila siddhi* for a whole day. The *GunjaTaila* is used in the indications of *Siroroga, Ardhavabhedaka, Shankhaka* and *Karna roga*.

Need Of Study

Standardization of herbal medicines is the process of prescribing a set of standards or inherent characteristics, constant parameters, definitive qualitative and quantitative values that carry an assurance of quality, efficacy, safety, and reproducibility[9]. **Gunja Taila is a medicated oil preparation mentioned in various classical texts like Chakradatta, Bhaishajya** *Ratnavali, Bhavprakash, Yogaratnakara* etc. and is mainly indicated in *Shiroroga*. The current study has been undertaken to standardize the *Gunja Taila* as per the references of *Chakradatta* and *Bhaishajya Ratnavali*.

OBJECTIVES

1. To compile the literary review regarding *Sneha Kalpana* w.s.r to *Gunja Taila*.
2. To prepare two different samples of *Gunja Taila* as per textual guidelines.
3. To develop SOP & SMP three batches of *Gunja Taila* as per the reference of ***Chakradatta***.[10]
4. To develop SOP & SMP three batches of *Gunja Taila* as per the reference of ***Bhaishajya Ratnavali.***[11]
5. To analyze the prepared samples following the standard parameters laid down as per API.

MATERIALS & METHODS

The study was be carried out in three different stages.

1. Drug Review
2. Pharmaceutical study
3. Analytical study

Drug Review:- *Gunja Taila* is *Vatakaphaghna, Ushna, Strota-varodhanashka, Kandu-krumi-kushtha hara, Keshya, Twachya, Balya*. Chemical composition of *Gunja* - alkaloids, steroids, flavones, terpenoides, proteins, amino acids, etc. *Gunja* is *Visha* (poison) but after *shodhana* works as anti-fungal agent for skin. It is widely used in skin affections.[12] Hence *Gunja Taila* can be preferably used in the *Vyadhi* like *Darunaka* for local application. Due to *Tridosha-shamaka* and *Vata-kaphashamaka* property of various drugs of *GunjaTaila*. These drugs are also having the other properties like *Keshya, Vishaghna, Jantughna, Daurgandhya-nashaka* and *Kandughna*. As such, the *Taila* thus prepared had *Laghu* and *Snigdha* properties with *Madhura* and *Kashaya* and *Tikta* and *Katu* Rasa with *Madhura Vipaka* and *UshnaVirya* which was intended to have a *Tridosha-shamaka* effect. The application of *Taila* on the scalp with

finger tips, it leads to increase the local blood circulation and promotes the absorption of the drug. The properties of *Gunja Taila* had been shown in Table no.4.

Pharmaceutical study

In this study an attempt was made to standardize "*Gunja Taila*" by preparing two samples with different classical treatise and named as GT-1 (Sample-1); GT-2 (Sample-2) by following S.O.P. and S.M.P. with reference to "***Chakradatta***" & "***Bhaishajya Ratnavali***" respectively. Furthermore, three batches (B1, B2, B3) were prepared for each Sample.

Place of Study

Departmental laboratory, Dept. of Rasa Shastra and Bhaishajya Kalpana laboratory, National Institute of Ayurveda, Jaipur.

Collection of Raw Drug

- *Tila Taila* was procured from the pharmacy, National institute of Ayurveda, Jaipur.
- *Rakta gunja* was procured from (Chunni Lal Kalyan Bux) registered local market shop in Jaipur.
- Rest all the raw materials were procured from the Pharmacy of N.I.A, Jaipur.
- All the crude herbal drugs were authenticated after the expert identification made by the experts of Dept. of *dravyaguna*, NIA, Jaipur and compared with the standards in Ayurvedic Pharmacopoeia of India.

The whole pharmaceutical study was conducted in following steps:

a) **Experiment no 1**: *Gunja Shodhana*

b) **Experiment no 2**: Preparation of *Kanji*

c) **Experiment no 3**: *Murchchhana* of *TilaTaila*

d) **Experiment no 4**: Preparation of Sample-1 (GTS1B1, GTS1B2, GTS1B3)

e) **Experiment no 5**: Preparation of Sample-2 (GTS2B1, GTS2B2, GTS2B3)

Experiment no 1: ***Gunja Shodhana***

Gunja shodhana was done in three batches (Batch-A, Batch-B, Batch-C) *swedana* process in *Go-dugdha* till 2*Yama* (6 h) *by Dolayantra* with the reference of *RasaTarangini* (24/443-444)**[13]**. Initially Amount of *Gunja* taken 2000g. The handling loss, transportation & adulterant loss was 100g. The net amount of *gunja* for *shodhana* process of 1900g. Quantity of *Go-dugdha* was taken 5 L in every batch of *Gunja shodhana*.

Pottali was made by a small piece of double layered cotton cloth and *Gunja* seeds were tied in it to make a *Pottali*. This *Pottali* was hanged in the vessel with the help of iron rod without touching the bottom of the vessel. Iron rod was supported by pipete stand on left side. The *Pottali* was hanged in a steel vessel and freshly collected *Go-dugdha* was filled in the vessel, up to the complete immersion of the *Pottali*, boiled on an L.P.G gas burner, for 6 h at 95ºC to 100ºC throughout the experiment. Total 5 L of *Go-dugdha* were utilized for one batch throughout the process. During boiling, milk gets reduced in the vessel so as to continue process, milk was added in three stages time to time. After boiling for 6 h, the seeds were taken out from *Pottali* and washed with lukewarm water followed by removal of seed coat. It was kept on a glass plate, for the shade drying. After proper drying, the seeds were collected and stored in air tight glass container. The *Gunja* wt. loss is approximately about 40% to 44 % in all the three batches. The loss is due to removal of seed coat and handling loss during drying. The remaining amount of *Go- dugdha* was 1.95 L after s*wedana* process and colour observed was light brown in colour. Before *shodhan Gunja* seed colour was reddish black but after *shodhana* and washing it was dark brown. *Gunja* seeds became soft as the *Swedana* process and final wt. was 1080 g shown in table no.5.

Experiment no 2: Preparation of *Kanji*

The principle of *kanji* preparation is *Sandhana Kalpana* with the reference of *Rasayanasara*[14]. It is an ingredient of *Gunja Taila* (Sample-2) hence, it was prepared.
As per Table no.6, *Rajika, Saindhava, Kulattha, Odana, Haridra, Vansha, Shunthi, Jeeraka, Hingu, Masha, SarshapaTaila* were used. It also includes some sub steps also like Preparation of *Kulattha Kwattha*, Preparation of Rice, *Shodhana of Hingu*, Preparation of *Masha Vataka* etc. It took 45 days for complete process of fermentation in month of Jan.

Preparation of *Kulattha Kwatha*: Initially *Kulattha* was weighed accurately by using digital weighing machine. It was pounded in *Ullukhala* Yantra and *yavakuta* (coarse powder) was prepared. Water was added in the ratio of 1:16. A mark was made on the vessel exactly at 1/8th level of water. It was kept untouched overnight. On next day morning the vessel was kept on gas stove and *Mandagni* was give till the liquid reduced to 1/8th (2 l) and filtered with double folded cotton cloth. *Hingu* was fried in a 15 g.

of ghee in a frying pan *Shodhana.*

Preparation of *Odana:* Rice was cooked in 5 times water. On completion it was removed from fire and allowed to self-cool. Further 9 times of boiled and cooled water was added to cooked rice. Thus, the total quantity of water added was 14 times. A clean porcelain pot of 20 L capacity was washed and dried properly. Pre-conditioning of pot was done by fumigating with *Guggulu* & *Trikatu churna*.

Preparation of *Masha Chakrikas:* Masha powder was made in to a thick paste by the addition of water. Small *chakrika* of this paste were deep fried in mustard oil. Initially 250 g. of *masha* floor was weighed accurately adding little quantity of water and Mustard oil, Masha paste was prepared. Then Mustard oil was taken in frying pan and kept on *mandagni*, then *masha* paste was fried in the hot mustard oil and thus *masha chakrika* was prepared.

Mustard oil was heated in an iron pan. *Rajika* and *Jeerak*, were added to hot oil, then turmeric and *Shunthi* was added and then the whole material was added to cooked rice. *Saindhava* was made in to fine powder, while leaves of *Vansha* were cut in to small pieces.

On 45th day *Kanji* was collected in another container by siphoning after observing the tests. The appearance of *Kanji* was clear fluid with residue settled at the bottom. Initially looking watery coloured liquid was turned to slight yellow colour due to crushed mustard and oil. It had sour taste with slightly salty due to *Saindhava* and also pleasant acidic odour. 10 L of *Kanji* was obtained. Some liquid was soaked by the residual matter, which settled down in the jar. The pH of *Kanji* observed was 3.1.

Experiment no 3: *Murchhana* of *Tila Taila*

Sneha murchchhana was done as per the reference of *Bhaishajya Ratnavali*[15] *(Jwara*5/1288-89). The primary intention of performing *Sneha murchchhana* is to remove *ama dosha* from raw *Sneha* and render readily absorbability of medicinal properties in it from the drugs with which it is processed.

Tila Taila Murchchhana has been conducted prior to preparation of *GunjaTaila* (Sample-2). All the *Murchchhana Dravyas* (shown in Table no.7) were made into *Yavakuta* form and soaked in water one day before *Sneha Murchchhana* for easier to *Kalka* preparation. For *murchhana of Tila Taila, Manjistha* was taken 200 g., 12.8kg water used for *Dravyadravya* and 3.2 kg *Tila Taila* was used for *Sneha dravya,* rest all *murchchhana dravya* were taken 50 g. each. After overnight soaking, final weight of the prepared *Kalka* was 950 g. Total three days were required to complete the *SnehaMurchchhana* and exactly 18 h were taken to complete the *SnehaMurchchhana* on gas stove. On 3rd day *Sneha Siddhi Lakshanas* were observed the *Taila* has been filtered in its mild hot stage to obtain maximum yield. In *Sneha Murchhna,* 3.20 kg *Tila Taila* was taken out of that 2.75 kg *Murchhita* oil was obtained and the total loss was 450 g means 14.07% loss. Consistency of the obtained *Murchhita Tila Taila* was found thicker.

Experiment no 4: Preparation of Sample-1 (GTS1B1, GTS1B2, GTS1B3)

All the three batches (S1B1, S1B2, S1B3) were prepared as the same procedure and same quantity of ingredients were used as shown in Table no.8. Three batches GTS1B1, GTS1B2, GTS1B3 each of 600 g., 605 g., 603 g. of *Gunja Taila* has been prepared respectively with intention to establish SOP & SMP. In *Gunja Taila* preparation *shuddha Gunja* sd. (175 g.) was subjected to *mardana* in *Khalva yantra* for *Kalka* preparation. Little amount of water was added to *shuddha Gunja* sd. powder till the mixture becomes semisolid. Final wt. of *Kalka dravya* of three batches GTS1B1, GTS1B2, GTS1B3 was 350 g, 360 g, 355 g respectively.

For *dravadravya* 6 kg of fresh *Bhringraja panchanga* were weighed and washed properly with distilled water. It was crushed using a mixer grinder. The paste was squeezed and filtered through a sterile clean cloth. *Swarasa* obtained was nearly about 2.8 kg and pH measured was nearly to 7.6. *Amurchchhita Tila Taila* was used as *Sneha dravya* each of 700 g. in all the batches.

Stainless steel vessels having capacity of 10 L has been taken for the process for 700 g *TailaPaka*. *TilaTaila* was taken into a stainless-steel vessel and heated over low flame till it becomes moisture free. Then prepared *kalka* was added little by little and stirred well. After 15 min *swarasa* of *Bhringraja* was added little by little and stirred constantly for 2 hr. Heating was stopped and *Taila* was allowed to stand overnight. Next day mixture was again heated for 3 h allowed to stand for overnight. The *Taila* was again heated on third day for 3 h. The heating process was continued till *sneha siddhi lakshana* appeared with intermittent stirring on 1st and 2nd day and continuous stirring on third day. Total heating duration was approximately about 8 hr. The total output of *siddhaTaila* was 600 g, 605 g, 603 g with loss of 14.28 % ,13.57% ,13.85 % in all the batches of *Gunja Taila* (GTS1B1,

GTS1B2, GTS1B3) respectively as shown in the table no.9. Loss in weight of oil due to because of some part of oil remains in *Kalka* also may be due to handling loss.

Experiment no 5: Preparation of Sample-2 (GTS2B1, GTS2B2, GTS2B3)

All the three batches (GTS2B1, GTS2B2, GTS2B3) were prepared as the same procedure and same quantity of ingredients were used as shown in Table no.10. Three batches GTS2B1, GTS2B2, GTS2B3 each of 603 g., 595 g., 600 g. of *Gunja Taila* has been prepared respectively with intention to establish SOP & SMP. In *GunjaTaila* preparation *shuddha Gunja* seed (175 g.) was subjected to *mardana* in *Khalva yantra* for *Kalka* preparation for 15 min. Sufficient amount of water was added to *shuddha Gunja* seed powder till the mixture becomes semisolid. Final wt. of *Kalka dravya* of three batches GTS2B1, GTS2B2, GTS2B3 was 355 g, 360 g, 350 g respectively. For *dravadravya* 2 kg of fresh *Bhringraja panchanga* were weighed and washed properly with distilled water. It was crushed using a mixer grinder.

The paste was squeezed and filtered through a sterile clean cloth. *Swarasa* obtained in all three batches was nearly about 1 kg and pH measured was nearly to 7.8. For *dravyadravya*, *Kanji* was prepared in **experiment no.2**. The quantity of *kanji* taken for each batch (B1,B2,B3) of sample-2 was 700 g. *MurchchhitaTilaTaila* was used as *Sneha dravya* each of 700 g. in all the batches. Stainless steel vessels having capacity of 10 l has been taken for the process for 700 g. of *TailaPaka*. *TilaTaila* was taken into a stainless-steel vessel and heated over low flame till it becomes moisture free. Then prepared *kalka* was added little by little and stirred well. After 15 min *swarasa* of *Bhringraja* was added little by little and after 10 min *Kanji* was added stirred constantly for 1.5 h. Heating was stopped and *Taila* was allowed to stand overnight.

Next day mixture was again heated for 1.5 h and allowed to stand for overnight. The *Taila*was again heated on third day for 1.5 h. The heating process was continued till *sneha siddhi lakshana* appeared with intermittent stirring on 1st and 2nd day and continuous stirring on third day. Total heating duration was approximately about 4 h 30 min. *Sneha siddhi Lakshana* observed in less time as compared to batches of sample-1 because quantity of *dravadravya* was half as compared to sample-1. The total output of *siddha Taila* was 603 g, 595 g, 600 g with loss of 13.85 % ,15% ,14.28 % in all the batches of *Gunja Taila* (GTS2B1, GTS2B2, GTS2B3) respectively as shown in the table no.11.

Analytical Study

Two samples of *Gunja Taila* with three batches each were subjected to analytical study.

The test parameters were taken according to "Protocol for testing of *Ayurvedic, siddha* and *unani* medicines". Pharmacopoeial Laboratory for Indian medicines, Ghaziabad[16]; *Ayurvedic* Pharmacopoeia of India, 2008 Dept. of Ayush, Govt. of India and "Laboratory Guide for the Analysis of *Ayuvedic* and *siddha* Formulations". CCRAS, Dept. of Ayush, Govt. of India,2010[17]

Place of Study

Analytical study of the *Gunja Taila* Samples was conducted at Drug Testing Laboratory, Department of Rasa Shastra and Bhaishajya Kalpana, National Institute of Ayurveda, Jaipur and Ayush approved S.R. LABS Pratapnagar Jaipur.

RESULTS

1- Determination of Organoleptic Characters

Results of Samples of *Gunja Taila* are shown in Table no.12

2- Determination of Physio-chemical Characters

Results of Samples of *Gunja Taila* are shown in Table no.13.

3- Determination of Contaminants.

Results of Samples of *Gunja Taila* are shown in Table no.14.

4- Sophisticated Instrumental analysis – HPTLC profile

Results of Samples of *Gunja Taila* are shown in Table no.15.

DISCUSSION

"Organoleptic evaluation" of G.T-1 and G.T-2 refers to the evaluation of a drug by Colour, Odour, Taste, consistency and appearance with the help of *Gyananendriya*. In case of G.T-1 & G.T-2 there was no difference in organoleptic change in between before and after *Tailapaka* except the colour change. Colour had change Radish yellow to Greenish yellow. Change of colour incorporated from *Kalka Dravya* which were added during *Tailapaka*. There was no foreign matter observed in both samples by watching naked eye and magnifying glass. **Baudouin's test** was positive which indicates the presence of *sesame oil* in both samples.

Specific Gravity: - This shows that specific gravity of sample-1 is greater than sample-2, that shows sample-1 had

more addition of drug extract in oleaginous media. It showed that step by step after each process specific gravity increased that may be due to addition of drug extract in oleaginous media.

Saponification Value: - The higher saponification value indicates, the lower the fatty acids average length, the lighter the mean molecular weight of triglycerides. So, saponification value decreased step by step in *TailaPaka.* This shows that the mean molecular weight increased due to addition of phytoconstituents of *dravadraya* and *kalkadravya*. This shows that average specific gravity of sample-1 is greater than sample-2, that shows sample-1 had more addition of drug extract in oleaginous media due to longer heating.

Peroxide Value: - The peroxide value observed in three batches of G.T-1& G.T-2 of *GunjaTaila* was found nil or not detected. Nill or not detectable peroxide value shows the antioxidant potential of the ingredients used for processing the oil, which also improve the effectivity and stability of the prepared samples.

Mineral Oil Test: -It is a qualitative parameter for determining the presence and absence of mineral oil in the sample. Mineral oil test value in three batches of G.T-1 & G.T-2 of *GunjaTaila* was found negative. It shows that there was no mineral oil in samples.

Viscosity: - Average Viscosity of sample-1 & sample-2 was respectively38.25 cP and 35.58 cP which shows normal level. The lower viscosity of both the samples indicates lower surface tension that signifies that the product can be taken out from the container easily and applied easily.

Total fatty matter: - Average Total fatty matter value observed in sample G.T-1(95.60%) was found higher than G.T-2 (93.85%). It also indicates the dissolved extracted matter from the ingredients to the final samples.

Refractive Index: - Average refractive index value in three batches of G.T-1(1.463) is lower than the average refractive index value in three batches of G.T-2(1.466). G.T-2 had minutely more RI than G.T-1 because total soluble solid in sample-2 is more than sample-1 because of less quantity of *dravadravya* taken in sample-2. But the data were found in limit for all samples according to pharmacopeial standards.

Rancidity: - Rancidity was found absent in both GT-1 and GT-2. It means that the product is stable in terms of its quality. It means there is no hydrolysis or auto oxidation of *Taila* which indicates absence of moisture content in both the samples.

Optical Rotation: - Average optical rotation value in three batches of G.T-1 (-4.62) was lower than the average optical rotation value in three batches of G.T-2 (-7.37). Both the samples have optical rotatory activity so they active components are considered to be chiral. Chirality plays important role in drugs.

Acid Value: - Acid Value indicates the amount of free fatty acid present in oil or fat. Free fatty acid content increases due to the exposure to air. Average acid value of three batches of *GunjaTaila*sample-1 (1.073 mg KOH/g) which was higher than average acid value of three batches of *Gunja Taila* sample-2 (1.186 mg KOH/g).

Iodine value: The iodine value of GT-1& GT-2was found under the limit as per the API specification and the average value of GT-1 (108.33) was found less than GT-2 (110.66) which denotes less unsaturation in GT-1 than GT-2. Iodine Value of both the samples which is less than that of sesame oil (103 – 112).

Heavy Metal Analysis: In the present analysis, atomic absorption spectrophotometry was used to determine the heavy metal contents Hg, As, Cd and Pb which were below the limits in both samples (G.T-1 & G.T-2). The toxicological profile is safe normal limit as per pharmacopeial standards. **Aflatoxins**: - Aflatoxins (B1, B2, G1 & G2) were not detected, which means the both samples (G.T-1 & G.T-2) are safe.

Total bacterial count & fungal count: - Total bacterial count & Total fungal count were within normal limits as per Ayurvedic Pharmacopoeia of India. Hence can be said that it is completely safe and have been prepared under Good Manufacturing Practices (GMP).

HPTLC finger print Profile: - It is an important tool to generate the standardization parameter for quality control purpose. Sample GT-1 and GT-2 were analysed on different wavelengths 510 nm, 366 nm (Long) & 254 nm (Short). It confirms 11 distinct spots at 510 nm, 06 distinct spots at 366 nm and 12 spots at 254 nm of GT-1 samples whereas 12 distinct spots at 510 nm, 06 distinct spots at 366 nm and 12 spots at 254 nm were observed in GT-2 samples. The Rf values of spots differentiate the chemical composition of the sample.

CONCLUSION

The pharmaceutical practice reveals that G.T-1 & G.T-2

can be easily prepared by taking precautions about various stages occurring during the *Sneha-Paka* and by paying attention to the *Sneha-Siddhi-Lakshanas*. The pharmaceutical practice reveals that G.T-1 take more time of heating to get *Sneha-Siddhi-Lakshanas* as compared to G.T-2 because of more quantity of *dravadraya*. During *Tila Taila Murchhna* 3.20 kg *Tila Taila* was taken out of that 2.75 kg *Murchchhita Tila Taila* was obtained and the total loss was 450 g with percentage loss of 14.07 %. The total average yield of G.T-1 (GTS1B1, GTS1B2, GT S1B3) was 600 g, 605 g, 603 g with percentage loss of 14.28 % ,13.57 % ,13.85 % in all the batches respectively. The total average yield of G.T-2 (GTS2B1, GTS2B2, GTS2B3) was 603 g, 595 g, 600 g with percentage loss of 13.85 %,15%, 14.28 % in all the batches respectively. The physico-chemical analysis of G.T-1 (GTS1B1, GTS1B2, GTS1B3) batches showed average specific gravity- 0.94, Average Saponification value- 184.66mg KOH/g, Average Viscosity- 38.25cP, Average Total fatty matter – 95.26 % w/w, Average Refractive Index- 1.462, Average Optical rotation – -4.62, Average Acid value - 1.073 mg KOH/g, Average Iodine value- 108.33. The physico-chemical analysis of G.T-2 (GTS2B1, GTS2B2, GTS2B3) batches showed average specific gravity- 0.90, Average Saponification value- 179.66mg KOH/g, Average Viscosity-35.58cP, Average Total fatty matter– 93.31 % w/w, Average Refractive Index- 1.466, Average Optical rotation– -7.37, Average Acid value- 1.186 mg KOH/g, Average Iodine value- 110.66. Both the samples G.T-1 & G.T-2 had no peroxide value, no mineral oil, no rancidity and no presence of heavy metals. Whereas, total bacterial count, total fungal count and aflatoxin value are under permissible limits. In HPTLC finger printing, though a few rf values were similar for both G.T-1 and G.T-2 but the chemical constituent could not be identified due to the absence of standard marker.

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ORCID

Jitendra Meena, https://orcid.org/0000-0002-3861-8127

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Table No.1: Showing the references of *Gunja Taila* in various classical text.

S.No.	*Reference treatise*	Ratio of ingredients
1	***Chakradatta***	*Shuddha Gunja* – 1part *Bhringraja swarasa* – 4 parts *TilaTaila* - 16 Part
2	***Yoga Ratnakara***	*Shuddha Gunja* – 1part *Bhringraja swarasa* – 4 parts *TilaTaila* - 16 Part
3	***Vrindamadhav***	*Shuddha Gunja* – 1part *Bhringraja swarasa* – 4 parts *TilaTaila* - 16 Part
4	***Vangasena***	*Shuddha Gunja* – 1part *Bhringraja swarasa* – 4 parts *TilaTaila* - 16 Parts
5	***Bhavprakash***	*Shuddha Gunja* – 1part *Bhringraja swarasaa* – 4 parts *TilaTaila* - 16 Parts
6	***Bhaishajya Ratnavali***	*Shuddha Gunja* – 1part *Bhringraja swarasa* – 4 parts *TilaTaila* - 4 Parts *Kanji* - 4 Parts
7	***Yoga Tarangini***	*Shuddha Gunja* – 1/5 part *Bhringraja swarasa* – Q.S *TilaTaila* - 4 Part *Ela* -- 1/5 part *Jatamansi* -- 1/5 part *Mura* -- 1/5 part *Kustha* -- 1/5 part Water -- 16 parts
8	***Brihada YogaTarangini***	*Triphala* -- 1/7 part *Loha Churna* – 1/7 part *Jatamansi* – 1/7 part *Bhringraja* – 1/7 part *Utpala* –1/7 part *Sariva* –1/7 part *Saindhava lawana* – 1/7 part *TilaTaila* – 4 parts
9.	***Brihad Nighantu Ratnakara***	*Gunja* fruit – ½ part *Gunja* root – ½ part *TilaTaila* – 1part Water -- 2 parts
10.	***Raja Martanda***	*Gunja* *Mahisi Dugdha*

Table no. 2: According to *Chakradatta*, the Ingredients of *GunjaTaila*.

S.no.	Ingredients	Latin name	Family	Part used	Proportion
1	*Gunja*	*Abrusprecatorius*	*Fabaceae*	Fruit	1 Part
2	*TilaTaila*	*Sesamum indicum*	*Pedaliaceae*	Oil	4 Parts
3	*Bhringraja Swarasa*	*Eclipta alba*	*Asteraceae*	Whole plant	16 parts

Table no.3: According to *Bhaishajya Ratnavali* the ingredients of *GunjaTaila*.

S.no	Ingredients	Latin name	Family	Part use	Ratio
1	*Gunja* seed	*Abrus Precatorius*	*Fabaceae*	Seed	1 part
2	*Kanji*		-	-	4 parts
3	*Bhringraja Swarasa*	*Eclipta alba*	*Asteraceae*	Whole plant	4 parts
4	*Murchchhita Tila Taila*	*Sesamum indicum*	*Pedaliaceae*	Oil	4 parts

Table no.4: Showing the properties of drugs of *GunjaTaila*.

Sr. No.	***Name of Drug***	***Latin Name***	***Rasa***	***Virya***	***Vipaka***	***Guna***	***Karma***
1	*Gunja*	*Abrus precatorius*	*Katu*	*Ushna*	*Katu*	*Ruksha, Tikshna, Ushna*	*Kanduhar, Keshya, Kushthahara, Vatapittagnha*
2	*Bhringraja*	*Eclipta alba*	*Katu*	*Ushna*	*Katu*	*Ruksha, Tikshna, Ushna*	*Twachaya,Keshya, Krumihara,Kushth hara,Kaphavataghna*
3	*Tila Taila*	*Sesamum Indicum*	*Katu, Madhura*	*Ushna*	*Katu*	*Snigdha, Ushna*	*Vatakaphaghna, Kanduhara.*
4	*Kanji*	--	*Amla*	*Ushna*	*Amla*	*Laghu, Ruksha, Tikshana*	*Kaphavata, Shamak*

Table no.5: Showing the final result of *Gunja Shodhana*.

Batch	**Batch-A**	**Batch-B**	**Batch-C**
Date-	15/09/21	18/09/21	21/09/21
Ashuddha Gunja	630 g	630 g	640 g
Dwiguna vastra wt.	38.5 g	38.0 g	39.0 g
Pottali wt.	668.5 g	668 g	679.0 g
Initial cow milk amount	3.8 L	3.8 L	3.8 L
Starting Time	09:30 AM	10:00 AM	10:00 AM
Evaporation starts at	09:50 AM	10:22 AM	10:20 AM
Stage 1: Addition of 300ml milk	11:00 AM	11:30 AM	11:32 AM
Stage 2: Addition of 300ml milk	12:00 AM	12:30 PM	12:33 PM
Stage 3: Addition of 300ml milk	01:30 PM	02:00 PM	02:04 PM
Stage 4: Addition of 300ml milk	03:00 PM	03:38 PM	03:30 PM
End Time	03:30 PM	04:00 PM	04:00 PM
Remaining Cow milk after *Shodhana*	1.95 L	2.0 L	1.90 L
Wt. of *Gunja* after removing cover and drying	355 g	360 g	365 g

Table no.6: Showing ingredients of *Kanji Nirman*

S.No.	**Ingredients**	**Latin name**	**Part used**	**Quantity**
1	*Rajika*	*Brassica juncea*	Seed	500 g.
2	*Saindhava*	*Rock salt*	Crystal	1 kg
3	*Kulattha (Kwatha)*	*Dolichos biflorus*	Seed	1 kg
4	*Rice*	*Oryza sativa*	Seed	1 kg
5	*Haridra*	*Curcuma longa*	Rhizome	500 g.
6	*Vansha*	*Bambusa arundinacea*	Leave	250 g.
7	*Shunthi*	*Zingiber officinale*	Rhizome	125 g.
8	*Jeeraka*	*Cuminum cyminum*	Seed	125 g.
9	*Hingu*	*Ferula nathrex*	Resin	62.5 g.
10	*Masha*	*Phaseolus mungo*	Seed	250 g.
11	*Sarshapa Taila*	*Brassica campestris*	Seed oil	1 Lt.
12	Water	---	--	10 Lt.

Table no.7: Showing ingredients of *Murchhnadravya* for *TilaTaila*.

S. No.	Ingredients	English Name	Family	Part Used	Ratio	Quantity
1	*Manjistha*	*Rubia cordifolia*	*Rubiaceae*	Stem	1/16	200 g.
2	*Haritaki*	*Terminalia chebula*	*Combretacae*	Fruit	1/64	50 g.
3	*Bibhitaka*	*Terminalia belerica*	*Combretacae*	Fruit	1/64	50 g
4	*Amalaki*	*Embelica officinale*	*Euphorbiaceae*	Fruit	1/64	50 g
5	*Musta*	*Cyprus rotundus*	*Cypraceae*	Rhizome	1/64	50 g
6	*Haridra*	*Curcuma longa*	*Zingiberaceae*	Rhizome	1/64	50 g
7	*Hrivera*	*Coleus vettiveroides*	*Lamiaceae*	Root	1/64	50 g
8	*Lodhra*	*Symplocos racemosa*	*Symplocaceae*	Stem, bark	1/64	50 g

Table no.8: Ingredients in the sample-1 of *Gunja Taila*.

S. No.	Ingredients	Latin name	Family	Part used	Proportion	Quantity
1	*Shuddha Gunja*	*Abrus precatorius*	Fabaceae	Fruit	1 Part	175 g.
2	*TilaTaila*	*Sesamum indicum*	Pedaliaceae	Oil	4 Part	700 g.
3	*Bhringraja Swarasa*	*Eclipta alba*	Asteraceae	Whole plant	16 Part	2.8 kg

Table no. 9: Total yield in the processing of GTS1B1, GTS1B2 & GTS1B3 of G*unja Taila* sample-1

Batches	Duration of *paka*	Yield	Loss
Batch -1 (GTS1B1)	8.15 hr.	600 g.	100 g. (14.28%)
Batch -2 (GTS1B2)	8.30 hr.	605 g.	95 g. (13.57%)
Batch -3 (GTS1B2)	8.30 hr	603 g.	97 g. (13.85%)

Table no.10: Ingredients in the sample-2 of *Gunja Taila*.

Ingredients	Latin name	Family	Part use	Proportion	Quantity
Shuddha Gunja	*Abrus Precatorius*	*Fabaceae*	Seed	1 part	175 g.
Kanji	-	-	-	4 parts	700 g.
Bhringraja Swarasa	*Eclipta alba*	*Asteraceae*	Whole plant	4 parts	700 g.
Murchchhita TilaTaila	*Sesamum indicum*	*Pedaliaceae*	Oil	4 parts	700 g.

Table no. 11: Total yield in the processing of GTS2B1, GTS2B2 & GTS2B3 of *Gunja Taila* sample-2.

Batches	Duration of *Paka*	Yield	Loss
Batch -1 (GTS2B1)	4 hr 30 min	603 g.	97 g. (13.85%)
Batch -2 (GTS2B2)	4hr 35 min	595 g.	105 g. (15%)
Batch -3 (GTS2B2)	4hr 26 min	600 g.	100 g. (14.28%)

Table No. 12: Showing results of organoleptic characters of *Gunja Taila.*

Samples	Batches	Colour	Odour	Appearance
Sample -1	Batch – 1 (GTS1B1)	Yellowish green	Characteristics	Oily liquid
	Batch – 2 (GTS1B2)	Yellowish green	Characteristics	Oily liquid
	Batch – 3 (GTS1B3)	Yellowish green	Characteristics	Oily liquid
Sample -2	Batch – 1 (GTS2B1)	Yellowish green	Characteristics	Oily liquid
	Batch – 2 (GTS2B2)	Yellowish green	Characteristics	Oily liquid
	Batch – 3 (GTS2B3)	Yellowish green	Characteristics	Oily liquid

Table No. 13: Results of Physiochemical analysis of *Gunja Taila*.

S. No.	Analytical Parameters	Samples-1			Samples-2		
		GTS1B1	GTS1B2	GTS1B3	GTS2B1	GTS2B2	GTS2B3
1	Foreign Matter	Nil	Nil	Nil	Nil	Nil	Nil
2	Specific gravity	0.95	0.96	0.92	0.90	0.91	0.90
3	Saponification value	184	185	185	180	181	178
4	Peroxide value	Nil	Nil	Nil	Nil	Nil	Nil
5	Baudouin's Test	Positive	Positive	Positive	Positive	Positive	Positive
6	Mineral oil Test	Negative	Negative	Negative	Negative	Negative	Negative
7	Viscosity at40ºC	38.95	39.00	36.80	35.00	35.50	36.25
8	Total fatty Matter	95.60 %	94.90 %	95.30 %	93.00 %	93.10 %	93.85 %
9	Refractive index	1.46	1.47	1.46	1.47	1.47	1.46
10	Brix Value	70	75	70	75	75	70
11	Rancidity	Absent	Absent	Absent	Absent	Absent	Absent
12	Optical Rotation	-4.18	-4.75	-4.95	-7.18	-7.10	-7.85
13	Acid Value	1.10	1.12	1.00	1.20	1.21	1.15
14	Iodine value	108	110	107	110	108	114

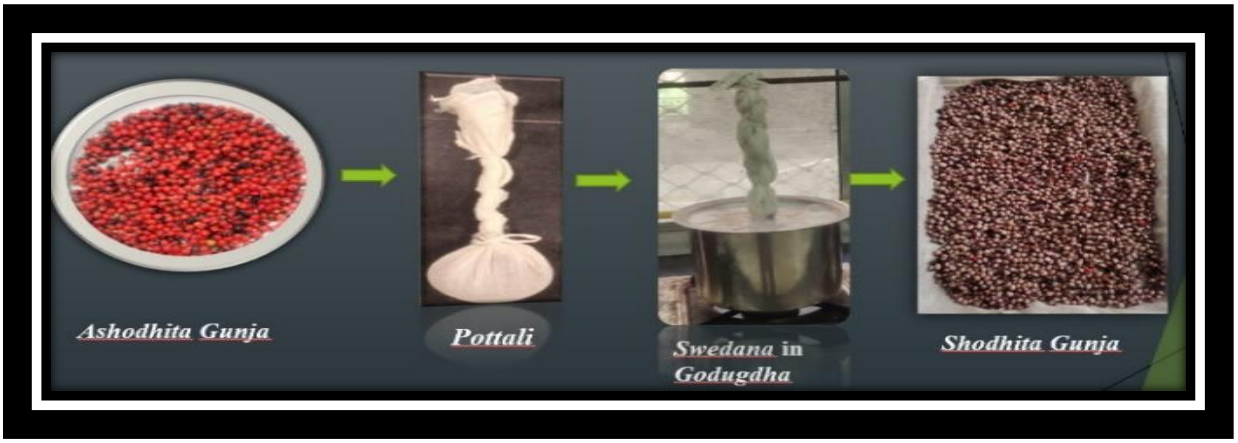
Table No. 14: Results of Contaminants.

1.	**Heavy Metals**	**Sample-1 (GTS1B1)**	**Sample-2 (GTS2B1)**
	Lead	0.23 mg/Kg	0.09 mg/Kg
	Arsenic	BLQ (LOQ 0.1) mg/Kg	BLQ (LOQ 0.1) mg/Kg
	Cadmium	BLQ (LOQ 0.1) mg/Kg	BLQ (LOQ 0.1) mg/Kg
	Mercury	BLQ (LOQ 0.1) mg/Kg	BLQ (LOQ 0.1) mg/Kg
2.	**Aflatoxins**	**Sample-1 (GTS1B1)**	**Sample-2 (GTS2B1)**
	Aflatoxin B1	BLQ (LOQ 0.05) mg/Kg	BLQ (LOQ 0.05) mg/Kg
	Aflatoxin B2	BLQ (LOQ 0.05) mg/Kg	BLQ (LOQ 0.05) mg/Kg
	Aflatoxin G1	BLQ (LOQ 0.05) mg/Kg	BLQ (LOQ 0.05) mg/Kg
	Aflatoxin G2	BLQ (LOQ 0.05) mg/Kg	BLQ (LOQ 0.05) mg/Kg
3.	**Microbiological Analysis**	**Sample-1 (GTS1B1)**	**Sample-2 (GTS2B1)**
	Total bacterial count	<10 cfu/g	<10 cfu/g
	Total fungal count	<10 cfu/g	<10 cfu/g

Table No.15: Showing the results of HPTLC of *Gunja Taila*.

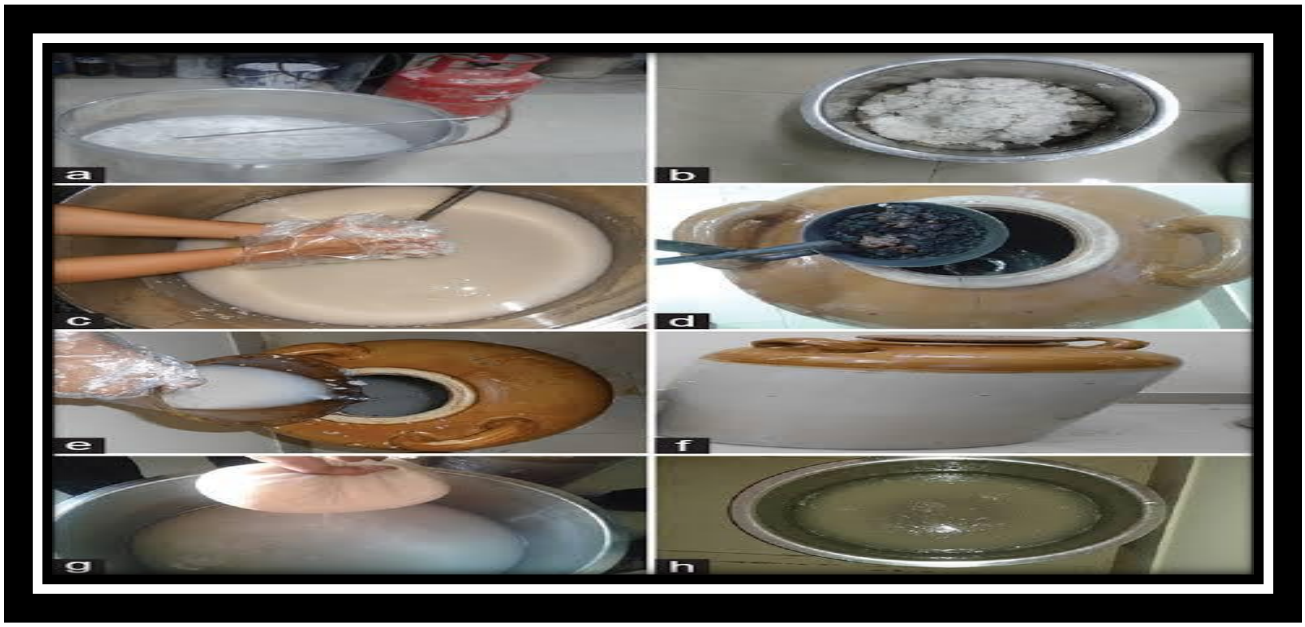
S. No.	Sample	Batch	254 nm	366nm	510 nm
1	*Gunja Taila Sample-1*	Batch – 1 (GTS1B1)	12 peaks	06 peaks	11 peaks
		Batch – 2 (GTS1B2)	03 peaks	02 peaks	06 peaks
		Batch – 3 (GTS1B3)	10 peaks	05 peaks	11 peaks
2	*Gunja Taila Sample-2*	Batch – 1 (GTS2B1)	12 peaks	06 peaks	12 peaks
		Batch – 2 (GTS2B2)	11 peaks	04 peaks	11 peaks
		Batch – 3 (GTS2B3)	11 peaks	04 peaks	12 peaks

Pharmaceutical Images



Experiment No.1: *Gunja Shodhana Process*

Experiment No.2: *Preparation of Kanji*



Experiment No.3: *Murchachhna of Tila Taila*

Tila Taila Murchchhana ***Murchchhana dravya* balls prepared**

Day 1 **Day 2** **Day 3**

Shbda pareeksha & Murchchhita Tila Taila

Experiment No.4: ***Preparation of Gunja Taila (G.T-1)***

Kalka dravya

Drava dravya i.e Bhringraja Swarasa

Sneha dravya i.e Tila Taila

Sneha paka of Gunja Taila sample-1

Day 1: Addition of *Kalka*

Day 1: Addition of Bhringraja Swarasa

Day 2

Day 3

***Gunja Taila* Sample-1**

Vartivata Pareeksha

Filteration of Taila

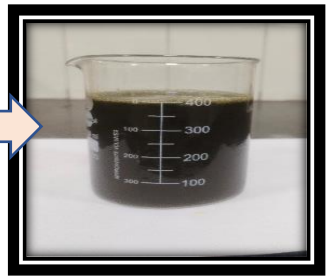
Bottling of Taila

Experiment No.5: *Preparation of Gunja Taila (G.T-2)*

Kalka dravya

Drava dravya i.e bhringraja Swarasa

Drava dravya i.e Kanji



Sneha dravya i.e Murchchhita Tila Taila

Sneha paka of Gunja Taila sample-2

Day 1:*Murchchhita Tila Taila*

Kalka Dravya

Day 1:Addition of *Kalka*

Day 1:Addition of *Bhringraja Swarasa*

Day 1:Addition of *Kanji*

Day 1

Day 2

Day 3

Vartivata Pareeksha ***Filteration of Taila*** ***Bottling of Taila***

Analytical Images

Figure.1

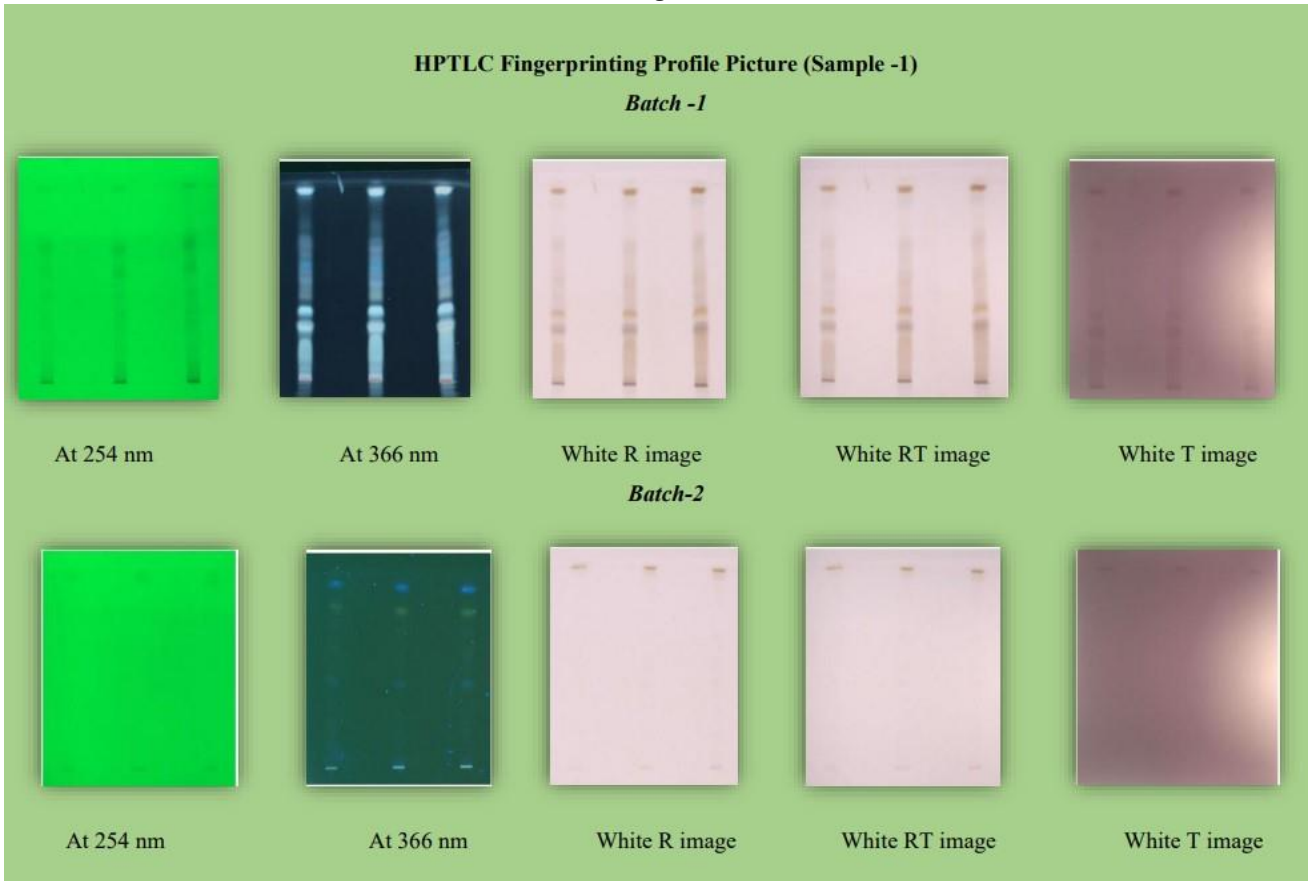


Figure.2

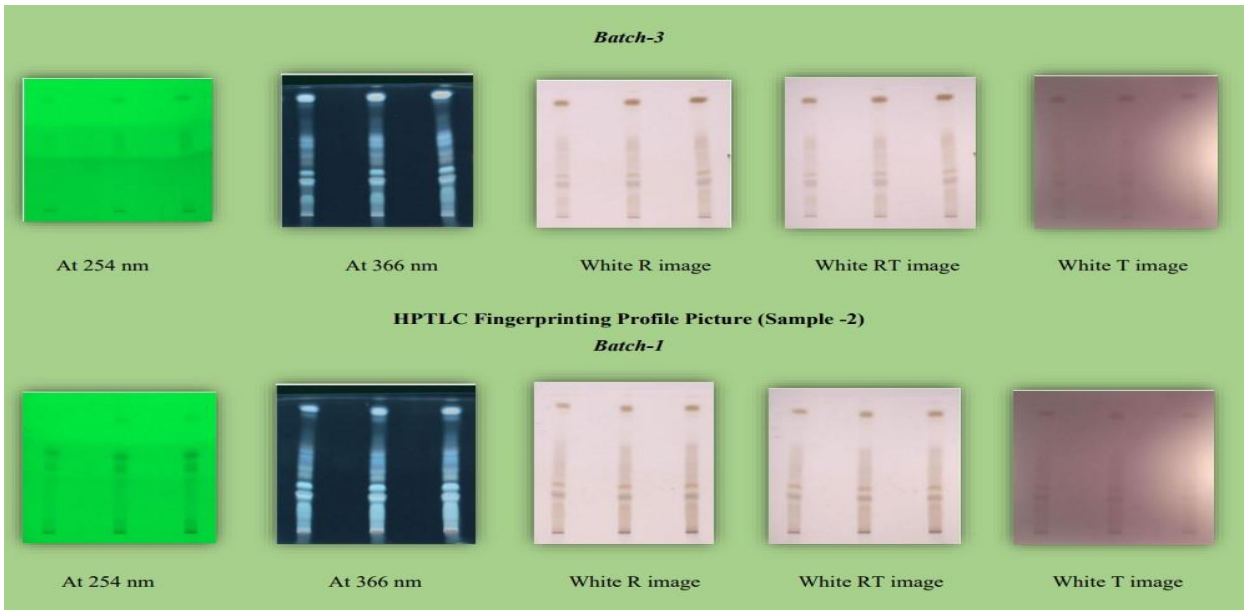


Figure.3