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Pharmaceutico-Analytical study of *Brihatsindooradya Taila* and its *Malahar*

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ABSTRACT:

The skin is the first organ of the body to come into contact with environmental factors like physical, chemical, and biological pollutants. The skin serves as a mirror, reflecting both internal and external pathology and thus assisting in the diagnosis of illness. Skin problems can affect persons of all ages, from infants to the elderly, and can cause deformity, disability, and other issues. This present study entitled "Pharmaceutico-Analytical study of *Brihatsindooradya Taila* and its *Malahar* ". was carried out with a view to standardize *Brihatsindooradya Taila* and prepare its modified forms viz. ointment. The present study is framed under 7 main sections viz. Introduction, Drug Review, Pharmaceutical Study, Analytical Study, Discussion, Summary and Conclusion.

Aim: The aim is to prepare BST as per textual guidelines and its *malahar* which is a modified dosage form & to analyze the prepared sample of BST and its *malahar* as per standard parameter.

Materials and Methods: Pharmaceutical study was conducted with the *Vatsnabha shodhan*, *Tandulodaka nirmana*, *Sindoora shodhan*, *Sarshapa Taila murchchhana*, preparation of *Brihatsindooradya Taila* (*BST)* and preparation of *Brihatsindooradya Malhar* (*BSM).*

Results: The findings for analytical 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. The *malahar* also had good thermal stability, easily washable, non-irritant and free from pathogens and no rancidity. In HPTLC finger printing van though a few RF values were similar for both BST and BSM the chemical constituent could not be identified due to the absence of standard marker.

Keywords: *Skin*, Yogratnakar, *pama, vicharchika, kachhoo, visharapa. Vatsnabha shodhan, Tandulodaka nirmana, Sindoora shodhan,*

INTRODUCTION

Bhaishajya Kalpana is a pharmaceutical branch of Ayurveda dealing with medicinal preparations, formulations, dosage, etc. Broadly two main types of *Sneh Kalpana* are described in Ayurvedic classics i.e., *Ghrita* & *Taila Kalpana*. *Sneha Kalpana* is successfully used for treating various disorders of nerve, skin

conditions etc. *Sneha Kalpana* is a process where the *Sneha, Kalka, Drava-dravya* and *Gandha-dravya* are employed for preparation of oleaginous medicaments (Oils and Ghee) which ensures absorption of the active therapeutic properties of the ingredients used. The Sneha preparations are used for internal and external purposes with external use being more in number specifically for *Vata-vyadhis.*

Topical applications of drugs have advantages of delivering the drug directly to the site of action. Skin is one of the most widespread and easily accessible organs on the human body for topical administration and is the main route of topical drug delivery system. Thus, an attempt to prepare topical agents like *malahar* (ointment) was done taking BST as its active ingredient.

Brihatsindooradya Taila (*BST)* and *Brihatsindooradya Malhar* (*BSM)* are examples of *Sneha Kalpana*, which are effectively used for the treatment of *Kustha*. *Brihatsindooradya Taila* (*BST)* has been mentioned in *Kushtha* by *Acharya Yogratnakar* .

Table no.1 Various refrences of *Brihatsindooradya Taila* (*BST)*

Need Of Study

External application of drugs in skin diseases is an important as internal medicament. It helps to provide better and quicker relief in the symptoms and after all it is non-hazardous. Taking all the above points for consideration – BST or malahar has been selected as external application for the present study to analyze their pharmaceutico-analytical parameters with API.. Considering all these facts present study entitled "Pharmaceutico-Analytical study of *Brihatsindooradya Taila* and its *Malahar*" has been planned.

AIMS AND OBJECTIVES

1-To compile the literary review regarding *Sneha Kalpana* wsr to *Brihatsindooradya Taila* .

2-To conduct the pharmaceutical – analytical study on BST and its *malahar*.

3-To prepare BST as per textual guidelines and its *malahar* which is a modified dosage form.

4-To analyze the prepared samples as per standard parameter laid down in API.

5-To analyze the prepared sample of BST and its *malahar* as per standard parameter.

Drug Review

Collection Of Raw Drug

All the raw drugs listed in this preparation were procured from the N.I.A. pharmacy, except *Sarshapa Taila, Jatamansi, Priyangu, Khadira, Karanaj* and *Chakrmarda drvyas* were procured from local market of Jaipur and identified by expert of *Dravyaguna* department of NIA Jaipur. Pharmaceutical study was conducted in the *Rasa shastra and Bhaishjya Kalpana* department of NIA, Jaipur.

Drug Review Of *Brihatsindooradya Taila* (Bst)

Brihatsindooradya Taila (BST) is one such preparation mentioned in *Yogaratnakar* under chapter of *kustha chikitsa* .BST having *kandu nashana*, *shrava rodhaka* and *tvaka shodhaka* properties will be used for external application which comprises of *Sarshapa, Sindoora, Pippali, Arka, Trivrut, Haridra, Daruharidra, Chandana, vatsnabha* and *karanj* etc. BST contains 24 ingredients as shown in table no.2.

From drug review it is clear that most of the drugs in above formulation are predominantly *Tridoshara*. Looking into overall properties of ingredients, most of them possess *Katu* (pungent) and *Tikta* (bitter) as dominant rasa (taste), *Laghu* (light)and *Ruksha* (rough) in nature (guna), with most of the drugs having *Ushna veerya* (hot potency) and *Katu vipaka.*

Drug Review Of *Brihatsindooradya Malhar* (Bsm)

Modified dosage form of *Brihatsindoordya Taila Malahar* will be prepared using *Brihatsindoordya Taila* along with other ingredients as listed in the table below.

Table no.3 Details of base ingredients of the *Brihatsindoordya Taila Malahar.*

Pharmaceutical Study

Pharmaceutical study is mainly related to manufacturing a safe, effective and quality drug, through pharmaceutical processing of the raw materials. *Brihatsindoordya Taila (BST)* was prepared according to the classical reference of text *Yogaratnakara* and other modified dosages *malahar* (ointment) process was conducted in the *Rasa shastra and Bhaishjya Kalpana* department of NIA, Jaipur.

The following processes were performed in this study

a) *Vatsnabha shodhan*

b) *Sindoora shodhan*

c) *Sarshapa Taila murchchhana*

d) Preparation of *Brihatsindooradya Taila* (*BST)*

e) Preparation of *Brihatsindooradya Malhar* (*BSM)*

A) ***Vatsnabha shodhan***[1,2]

Reference: AFI Part-1 **(***Rasamrita parisista* 8, Page 145) & *Rasa Tarngini* 24/20-21.

Method: *Dola yantra viddhi*

In pharmaceutical process *Vatsnabha shodhan* was done in two steps. In first step 250 g of *Ashudha Vatsnabha* was taken and dipped into *Gomutra* for 3 days and the yield was 117.5 g. This *Vatsnabha* was further processed through step two in which *Vatsnabha* was tied in a *Pottali* and placed in a vessel filled with *Godugdha* and boiled for 3 h. After this complete process of *Shodhan*, wt. of *Vatsnabha* was 105 g with total 145g (58.16 %) loss. The loss during 1st step occurred due to removal of the damaged portion of *Vatsnabha* and while removing external layer of *Vatsnabha*. The loss during the 2nd step occurred while fine powdering and sieving. *Ashudha Vatsnabha* was hard in nature and dark brown in colour while *Shodhita Vatsnabha* was soft in nature and colour changed to yellowish brown and then to brown after completion of *Shodhan*. *Shodhita Vatsnabha* was *Gomutragandhi*. These changes were due to use of *Gomutra* and *Dugdha Swedana* during the *Shodhan*.

B) ***Sindoora shodhan***[3]

Refrence: AFI-1, Vol-1, (*Yogaratnakara*, page 140)

Method: 7 *Bhavana*

Ashudha Sindoora was in powder form and red in colour. After 3 *Bhavnas* each of *Nimboo swarasa* and *Tandulodaka*, the red colour of *Sindoora* changed to orange colour and it became finer. A total 18g (7.40%) wt. gain in *Sindoora* was observed during the *Shodhan* process. Initial wt of *Sindoora* i.e.,243 g increased to 261 g after *shodhan*. The probable reason of wt. gain may be due to addition of *Tandulodaka* which contains dissolved starch.

C) Sarshapa Taila murchchhana

Reference: *Bhaishjya Ratnavali*, *Jwara* 5/1288-89

Equipments : Pounding instrument, Grinder, spatula, Thermometer, Gas stove, Stainless steel vessel with 40 ltr capacity(40 cm diameter and 32 cm depth) for *Sneha paka*, measuring cylinder, clean cotton cloth, PET jar.

Table no. 4 Showing the ingredients used in *Sarshapa Taila Murchchhana.*

Procedure

f) The properly cleaned herbs were made into very fine powered one by one with the help of iron *khalva yantra* and mixer grinder. Then 1475g powered were mixing well one by one and added water 2.300 lit all powered were soaked properly. Kept for overnight then next 500 ml more add water and grinding for 3 h. After grinding weight of *Kalka* is 3930g.

g) Then 6000 gms of *Sarshapa Taila* was taken into the stainless - steel vessel and kept on electric furnace with medium flame. Then the moisture present in *Taila* was evaporate and foam was disappearing from the *Taila*. At that time temperature of *Taila* was 144ºC. Then the vessel Around temperature 120ºC *Kalka* was mixed in *Taila* slowlyand stirred well.

h) After mixing the *Kalka* temperature was goes down around 92º C. keep it again electric furnace on mild flame and after 15minute 15 l water was added. At that time temperature was 50º C. Then subjected to heated for 2 h with constant stirring, with maintaining the temperature around 85º - 95º C. Stop heating and allow standing for overnight.

i) Next day same temperature and procedure were carried out more 2 days till

Sneha Sidhi lakshana appeared. 2nd day heating process done around 7 hours.

j) After complete appearance of *Sneha Sidhi lakshana* that vessel was taken out from the heat and them filtered through cloth to another stainless - steel vessel. Remaining *Kalka* water was taken 7 lit more added and kept for overnight.

k) Next day heating process done around 1.30 h. Then *Taila* filtered and collect another stainless steel and heat till moisture present in *Taila* was evaporated then *Taila* was filtered another stainless steel.

OBSERVATION

A specific sound and smell appear with some bubble during *Sneha paka* when

Kalka drvyas were added in *Taila*. Consistency of Taila becomes thicker. In final stage *Phenodgama* occurs in *Taila*.

D) **Preparation of *Brihatsindooradya Taila* (*BST*)**[4]

After completion of *Murchchhana* process it was subjected for *Sneha paka.* **Refrence:** *Yogaratnakara*, *kustha chikitsa* (*shlok no*.186-189), page no 659

Method : *Sneha paka*

Equipment : As per used in *Sneha Murcchana*

Procedure

The properly cleaned herbs (1 -22 shown in table no.2) were made into very fine powered one by one with the help of iron *khalva yantra* and mixer grinder.1475 g powder was taken in a vessel and soaked with 3000g water.3930 g Weight of *Kalka* after adding water was 3930g. Then the Kalka was kept for night. 6000 g *Sarshapa Taila* was taken in a vessel. Vessel was kept on gas stove and heat on mild flame to remove the moisture content and put down of fire.*Kalka* was added and vessel kept on the gas stove, and constant stirring for the homogenous mixing. After 5min 6000 g water was added and heated over mild flame withcontinuous stirrer .After some time *Taila* was started boiling. After that same process to be followed untill *Sneha siddhi lakshana* appears.

Table no. 5 Showing the *Sneha Sidhi lakshana* during BST.

E) **Preparation of *Brihatsindooradya Malhar* (*BSM*)**[5]

Equipment : Heating mental**,** Stirrer, Beaker, Vessel, Spoon etc.

Method : Emulsification

Table no.6 Showing the ingredient of *Brihatsindooradya Malhar* (*BSM)*

Procedure : It was done in two phases

1st Phase : First distilled water was taken in a vessel. MPS was added in distilled water and kept on heating mental and stirrer. They are heated at 85^{o} - 90^{o} C.

2nd Phase : Active part *Taila* was taken in another vessel. Kept on heating mental and added in oil bee's wax, Paraffin wax, cetostearol alcohol, cetyl alcohol, emulsifying wax, GMS, stearic acid and IPM was added one by one and stirrer till melt. They are heated at 85^{0} - 90^{0}C. Then both vessels were taken off the heat. Distilled water was agitation with stirrer while adding *Taila* to it slowly. When the temperature was reduced liquid form converted into semi solid form and creamish in colour. Then added fragrance and colour and stirrer switched off. This process was done around 3 hour.

2. Analytical Study

The tests p H , specific gravity and refractive index were conducted at Drug Testing Laboratory, Department of Rasa shastra and Bhaishajya Kalpana, National Institute of Ayurveda, Jaipur, Rajasthan and Organoleptic Characters, Physio- Chemical Analysis (except pH, specific gravity, and refractive index), Total aflatoxins, Total bacterial count were conducted at S.R. LABS Pratap Nagar Jaipur.

A. Organoleptic Characters

Table no. 6 organoleptic examination of following samples of BST and BSM

B. Physicochemical Analysis

Table no. 7: Showing the physicochemical parameters of *BST & BSM Samples*.

A. Determination Of Viscosity[6]

It is a property of liquids, that measures of its frictional resistance (Resistance to flow). A liquid may consisting of molecular layers arranged one over the other. When a shearing force is applied to a liquid, it flows. However, the forces of friction between the layers offer resistance to this flow.

Viscosity of BST was 44.55 cP whereas *malahar* is 3800 cp which shows normal level. Due to lower surface tension. It also signifies that the product can be taken out from the container easily and applied easily.

B. Determination Of Specific Gravity[7]

The specific gravity of a substance (liquid) is the weight of a given volume of that substance at the status temperature as compared with the weight of an equal volume of water at the same temperature, all weighing being taken in air. Specific gravity of BST was 0.876 which indicates that it has lower density as compared to water, so it floats on water and it shows *Laghutva* property of *Taila*.

C. Determination Of Refractive Index[8]

The Refractive index (ṅ) of a substance is termed as the ratio of the velocity of light in vacuum or air, to that in the substance. The refractive index is related to the ease with which light passes through the fat. Refractive index is generally used to measure the concentration of solute in a solution. Here the refractive index of BST was 72, which is higher than that of water (1.33)

D. **Determination Of pH**[9]

The pH value of an aqueous liquid may be defined as the

common logarithm of the reciprocal of the hydrogen ion concentration expressed in gram per litre, The pH of BSM was 6 which is slightly acidic and it doesn't cause any harmful effects or reactions on skin.

E. Determination Of Rancidity[10]

Rancidity is a process which is accompanied by the formation of the unpleasant odour, taste and as a result of action of moisture, oxygen of air and enzymes .Rancidity was found absent in both BST and BSM. It means that the product is stable in terms of its quality.

F. Determination Of Iodine Value[11]

The number of grams of iodine absorbed by 100 gram of the sample material when determined by using Wijs solution. Iodine Value is a measure of the degree of unsaturation of oil/fat. It is a useful parameter in studying the oxidation rancidity of oils/fat, since higher the unsaturation, greater the possibility of the oil to become rancid. The study shows that Iodine value of BST was 23.03 and BSM was (80.98) which is less than that of sesame oil (103 – 112). It means less C=C bonds are present in BST than the sesame oil i.e., comparatively less saturated. The level of oxidation in a sample can determine by the rancidity test.

G. Determination Of Acid Value[12]

Acid Value indicates the amount of free fatty acid present in oil or fat. Increase in free fatty acid in a sample indicated hydrolysis of triglycerides. Such reaction occurs by the action of lipase enzyme and it is an indication of inadequate processing and storage condition. Free fatty acid content increases due to the exposure to air. Here the acid value of BST was 0.05 mg KOH/g which is slightly more than sesame oil and BSM 0.71 mg KOH/g.

H. Determination Of Peroxide Value[13]

Peroxide value gives the initial evidence of rancidity in unsaturated fats and oils. The best test for auto-oxidation (oxidative rancidity) is determination of the peroxide value. The peroxide value of BST was 3.30 m eq of O2/Kg and BSM was 1.19m eq of O2/Kg. This shows that BST and BSM are free from moisture content and has less chances of rancidity.

I. Determination Of Saponification Value[14]

Saponification value refers to the amounts of esters that can be hydrolysed and turned into soap. Saponification value of BST was 12.82 mg KOH/g and BSM was 110.47 mg KOH/g. It shows that it has less value than the sesame oil i.e. (188 – 195).

J. Determination Of Ester Value[15]

Ester value of BST was 12.77 and BSM was109.76. In the study BSM was found to be Physically stable by its texture, colour and consistency at temperature 5^{o}C, 25^{o}C and 45^{o}C and 70 % relative humidity for four weeks in a close container. It means it is not altered by the varying temperatures in different seasons and different regions.

K. Determination Of Free Fatty Acid[16]

The free fatty acid content is expressed as oleic acid equivalents. It is a relative measure of rancidity as free fatty acids are normally formed during decomposition of oil glycerides. Free Fatty Acid of BST was 96.71 %w/w and BSM was 0.35.

L. Determination Of Total Fatty Matter

Total fatty matter content refers to the sum of triglycerides, phospholipids, wax ester, sterols and minor amount of non-fatty material. Here BST has 96.71 % w/w and BSM 28.66 % w/w total fatty matter.

M. Determination Of Spread ability

Spread ability consists of the expansion of a semi solid formulation on a surface after a certain time. Spread ability of was BST 3.0 g.cm/s and BSM 4.0 g.cm/s. which shows that the *malahar* is easy to apply on the skin surface.

N. Test For Heavy Metal[17]

Heavy metals is a group of tests that measures the quantity of specific potentially toxic metals in ayurvedic/unani/siddha and food stuffs. These heavy metals are lead, cadmium, mercury and arsenic.The procedure used was wet digestion. The Metal content of the sample will be calculated according to the following equation by AAS in ppm unit. *Shatpala Ghrita* samples were free from Heavy metals and it was safe for therapeutic purpose.

O. Test For Afflatoxins[18]

Aflatoxins are closely related group of secondary metabolites shown to be mycotoxin. They are produced by fungus named Aspergillus flavus. There are four types of B1, B2, G1, G2. Aflatoxin residue are highly toxic and causes carcinogenicity. Aflatoxins B1, B2, G1 and G2 are in below low quantity .

P. Microbiological Analysis[19]

Total bacterial count, Total fungal count and Enterobacteriaceae were within normal limits as per Ayurvedic Pharmacopoeia of India so the sample was free

from bacterial and fungal infection. Hence can be said that it is completely safe and have been prepared under Good Manufacturing Practices (GMP).

Q. Phytochemical Screening: Qualitative Test

HPTLC: HPTLC finger print profile was also performed for both BST and BSM HPTLC Fingerprint profile confirms standard scanning of samples to generate the standardization parameter for quality control purpose. It provides quantitative information of the main constituents of the drug. Samples were analysed on different wavelengths 254nm, 366nm and 510nm.

Rf value for BST at 254nm wavelength 11 spots are found at 0.03,0.04,0.06,0.23,0.46, 0.53, 0.56,0.63,0.72,0.92,0.95. Rf value of 366nm wavelength 5 spots are found 0.03, 0.05, 0.60, 0.69, 0.89. Rf value of 510 nm wavelength 10 spots are found -0.01, 0.00, 0.04, 0.10, 0.18, 0.22, 0.29, 0.53, 0.73, 0.94.

Rf value for BSM at 254nm wavelength 11 spots are found at 0.02,0.04,0.05,0.18,0.37, 0.49, 0.54,0.61,0.72,0.91,0.95. Rf value of 366nm wavelength 5 spots are found 0.02, 0.04, 0.47, 0.69, 0.69. Rf value of 510 nm wavelength 10 spots are found -0.03, -0.01, 0.01, 0.09, 0.17, 0.20, 0.25, 0.41, 0.69, 0.88.

All three samples showing large number of spots which ultimately denotes that samples have large number of active principles. The scanning data shows different spots visualized get confirms the chemical nature and distribution pattern in specified mobile phase.

RESULTS AND DISCUSSIONS

After *paka* the odour of BST & BSM lead to aromatic due to addition of *drava dravyas*. All samples are in semiliquid consistency before *Sneha paka* then leads to liquid consistency due to *agni sanyog* for long duration. After *shodhan* wt of *Vatsnabha* was 105 g with 145g (58.16 %) loss because damaged portion of *Vatsnabha* were removed.While cutting the *Vatsnabha* external layer was removed. After *Sindoor Shodhan* it was found orange in colour. Initial wt of *Sindoora* 243 g after *shodhan* 261 g, after *Bhavna* wt gain was18g (7.40%). When *Tandulodaka* and *Nimboo swarasa* were added to *Sindoora*, it became liquid with suspended *Sindoora* particle. After *Shodhan* it was found orange colour. After *murchchhana Sarshapa Taila* was obtained 4300 g with loss 1700 g (28.33%).Final yield of BST *Taila* after the completion of *Sneha paka* is 3385 gm with the loss of 15.37%. For better patient acceptability of modified dosage forms, it was decided to convert BST into *Malahar* (ointment) form because *Taila* is sticky in nature and sometimes it causes burning sensation to skin. The changes during the preparation of the *taila* indicates the different chemical changes occurring during the transferring of the properties from *drava* medium into the taila medium. The aqueous medium in the preparation of *taila* facilitates the imbibitions of the water soluble extracts into the oil medium. Therefore, modified dosage forms like cream, lotion etc have better potential as a vehicle to administer drug topically, because they are less sticky, are stable and have aesthetic value. Final *malahar* weight obtained was 4900g with a loss of 100 g (2%). The colour of *malahar* was creamish and was having odour of *Taila*.

In Ayurveda, the analytical techniques have always been mentioned in classical texts to understand the quality of the product i.e., *Grahya Lakshana*, Method of collection etc. for raw drug, *Siddhi Lakshana* for final product and for medicament. The **pH** of BSM was 6 which is slightly acidic and it doesn't cause any harmful effects or reactions on skin. **Specific gravity** of BST was 0.876 which indicates that it has lower density as compared to water, so it floats on water and it shows *Laghutva* property of *Taila*. **Refractive index** of BST was 72, which is higher than that of water (1.33)**. Viscosity** of BST was 44.55 cP whereas malahar is 3800 cp which shows product can be taken out from the container easily and applied easily. **Spreadability** of was BST 3.0 g.cm/s and BSM 4.0 g.cm/s. which shows that the malahar is easy to apply on the skin surface. BST has 96.71 % w/w and BSM 28.66 % w/w total fatty matter. This is be due to the presence of varied amount of fatty content added the **acid value** of BST was 0.05 mg KOH/g which is slightly more than sesame oil and BSM 0.71 mg KOH/g. **Saponification value** refers to the amounts of esters that can be hydrolysed and turned into soap. Saponification value of BST was 12.82 mg KOH/g and BSM was 110.47 mg KOH/g. It shows that it has less value than the sesame oil i.e. (188 – 195). **Iodine value** of BST was 23.03 and BSM was (80.98) which is less than that of sesame oil (103 – 112). It means less C=C bonds are present in BST than the sesame oil i.e., comparatively less saturated. **Rancidity** was found absent in both BST and BSM. It means that the product is stable in terms of its quality. Ester value of BST was 12.77 and BSM was109.76. In the study BSM was found to be **Physically stable** by its texture, colour and consistency at temperature 5oC, 25 oC and 45 oC and 70 % relative humidity for four weeks in a

close container. It means it is not altered by the varying temperatures in different seasons and different regions. Free Fatty Acid of BST was 96.71 %w/w and BSM was 0.35.The **Peroxide value** of BST and BSM are free from moisture content and has less chances of rancidity. Aflatoxins B1, B2, G1 and G2 are in below low quantity. Total bacterial count, Total fungal count and Enterobacteriaceae were within normal limits as per Ayurvedic Pharmacopoeia of India.

HPTLC Fingerprint profile confirms standard scanning of samples to generate the standardization parameter for quality control purpose. BST & BSM were analyzed on different wavelengths 254 nm, 366 nm and 510 nm having 11, 5, 10 spots respectively. The presence of these spots could be due to the addition of various *Kalka dravya and Dravadravyas*. But due to the absence of any standards, the specific compound could not be separately identified.

CONCLUSION

Literature review suggested that BST is mentioned in *Yogratnakar , Bhaishjya Ratnavali, Gada nighraha, Vanga sena, Vrindh madhav, Chakradatta, Vrihat Nighantu Ratnakar, Yoga Chintamani, Yoga tarangini, Vrihat yoga Tarngini and Rasa Kamdhenu in kushtha roga*. For the study of *Brihatsindooradya Taila* this formation was selected from *Yogaratnakar, Kustha Chikitsa*, shlok no.186-189.BST having *kandu nashana ,shrava rodhaka and tvaka shodhaka* properties will be used for external application. BST and its modified forms like *malahar* are prepared as per classical and modified reference under laboratory practices in the departmental laboratory of NIA, Jaipur by establishing proper SOP and SMP. The formula BST consisits of 24 ingredients viz. *Sindoor, RaktaChandana, Jatamansi, Vidang, Haridra, Daruharidra, Priyangu, Padyamaka, Kushtha, Manjishtha, Khadir, Vacha, Jati, Arka, Trivrit, Nimba, Karanj, Vatsnabha, Pippali, Chitraka, Lodhra, Chakramarda and sarshapa Taila*. The drugs are easily available and cost effective. The pharmaceutical process reveals that BST can be easily prepared by taking caution about various stages occurring during the *Sneha-Paka* and by paying attention to the Sneha-Siddhi-Lakshanas. Furthermore, preparation of a stable, effective and good consistency emulsion was formulated in the form of BSM. The *Malahar* was prepared in single day the yield of 5 kg. A total average yield of 3385 g of BST was obtained with an average percentage loss of 15.37%. The *malahar* also had good thermal stability, easily washable, non-irritant and free from pathogens and no rancidity. In HPTLC finger printing van though a few rf values were similar for both BST and BSM the chemical constituent could not be identified due to the absence of standard marker.

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Table no.1 Various refrences of *Brihatsindooradya Taila* (*BST)*

S.No.	Classical treatise	Name	Reference
1	*Bhaishjya Ratnavali*	*Brihatsindooradya taila*	*Shri Govind das, Bhaishjya Ratnavali, edited by shri kaviraj ambikadatta shastri varansi chaukhambha prakashana, edi.,2018 (kustha chikitsa54/282-285), pg no. 908*
2	*Gada nighraha*	*Sindooradya tailam*	*Shri Vaidhya shodhal, Gada nighraha, edited by shri ganga sahaya pandeya, varansi chaukhambha Sanskrit series office, part- 2, edi.,1969(kustha chikitsa 36/203-206)*
3	*Vanga sena*	*Sindooradya tailam*	*Vangasen Samhita with Hindi translation by Kavivar Shri Shaligramji Valshaya edited by Sri Vaidya Srikrishnadas Prakasan Mumbai, Edition 1996, Rasayanadhikar / 40-42.*
4	*Vrindh madhav*	*Brihatsindooradya taila*	*Acharya Vaidya Tarachand sharma, Vrindh madhav or siddha yoga, edited by maharshi Vaidya Dayaram Awasthi shastri, chaukhambha Sanskrit bhawan, edi., 2012. (kustha chikitsa, shlok no.129-132)*
5	*Chakradatta*	*Mahasindooradya tailam*	*Chakrapanidatta, Chakradatta, hindi commentary Bhavarthasandipini, edited by bhishagratna PT. Brahmashankar Mishra, varansi chaukhambha Sanskrit series office.edi.,2008 (kustha chikitsa shlok no.153-156)*
6	*Rasa Kamdhenu*	*Brihatsindooradya tailam*	*(Kustha chikitsa 41/584-587), pg. no. 213*
7	*Vaidya chintamani*	*Bhrihat sinduradi taila*	*Kustha roga prakarnam shlok no. 231-234 pg.no.407*
8	*Yoga*	*Sindooradi tailam*	*Shri trimal bhatt, Yoga tarangini*

Table no. 2 Ingredients of *Brihatsindooradya Taila* (BST)

S. No	Ingredients	English Name	Part used	Quantity
1	*Shuddh Sindoor*	*Lead oxide*	--	1 Part
2	*RaktaChandana*	*Pterocarpus santalinus*	heartwood	1 Part
3	*Jatamansi*	*Nordostachys jatamansi*	Mool	1 Part
4	*Vidang*	*Embelia ribes*	Fruit	1 Part
5	*Haridra*	*Curcuma longa*	Kanda	1 Part
6	*Daruharidra*	*Berberis aristata*	Kanda	1 Part
7	*Priyangu*	*Callicarpa macrophylla*	Flower	1 Part
8	*Padyamaka*	*Prunus cerasoides*	Twak	1 Part
9	*Kustha*	*Sausserea lappa*	Mool	1 Part
10	*Manjishtha*	*Rubia cordifolia*	Mool	1 Part
11	*Khadir*	*Acacia catechu*	Twak	1 Part
12	*Vacha*	*Acarus calamus*	Mool	1 Part
13	*Jati*	*Jasminum officinale*	Leaf	1 Part
14	*Arka*	*Calotropis procera*	Leaf	1 Part
15	*Trivrit*	*Operculina terpentum*	Mooltwak	1 Part
16	*Nimba*	*Azardiarachta indica*	Leaf	1 Part
17	*Karanj*	*Pongamia pinnata*	Leaf	1 Part
18	*Vatsnabha*	*Aconitum ferox*	Mool	1 Part
19	*Pippali*	*Piper longum*	Fruit	1 Part
20	*Chitraka*	*Plumbago zeylanica*	Mool	1 Part
21	*Lodhra*	*Symplocos racemosa*	Twak	1 Part
22	*Chakramarda*	*Cassia tora*	Seed	1 Part
23	*Mustard oil*	*Brassica nigra*	Seed oil	4 Part
24	*Jala*	*Water*	--	16 Part

Table no.3 Details of base ingredients of the *Brihatsindoordya Taila Malahar.*

S. No.	Ingredients	Uses
1	*Brihatsindoordya Taila*	Active ingredient
2	Distilled water	To formulate phase I (Aqueous Phase)
3	Paraffin wax	Thickening
4	Bees wax	Thickening/ Emollient
5	Emulsifying wax	Emulsifying agent
6	Stearic acid	Emulsifier
7	Glycerol mono stearate (GMS)	Emulsifier
8	Iso propyl alcohol (IPA)	Emollient
9	Cetyl alcohol	Thickening agent
10	Methyl paraben sodium (MPS)	Preservative
11	Ceto stearyl alcohol (Ginol 1618)	Emulsifying agent
12	Colour	Coloring
13	Fragrance (*Chanadan*)	Fragrant

Vatsnabha Shodhana

Sindoora Shodhana

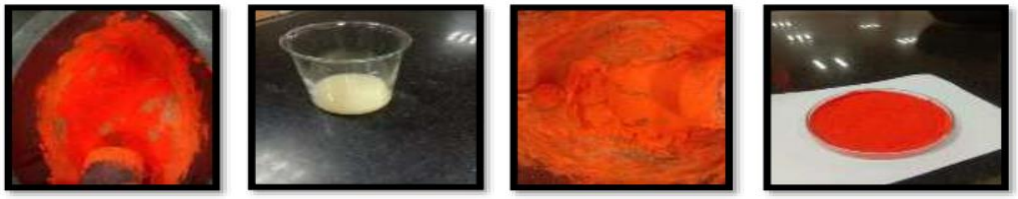

Table no.4 Showing the ingredients used in *Sarshapa Taila Murchchhana*.

Sr. No.	Ingredients	Latin Name/English Name	Family	Part Used	Quantity (g)
1.	*Amalaki*	*Embelica officinale*	*Euphorbiacea*	Fruit	94
2.	*Haridra*	*Curcuma longa*	*Zingiberacea*	Rhizome	94
3.	*Musta*	*Cyprus rotundus*	*Cypraceae*	Rhizome	94
4.	*Bilva*	*Aegle marmelos*	*Rutacea*	Fruit	94
5.	*Dadima*	*Punica granatum*	*Punicaceae*	Dry seed	94
6.	*Nagkeshar*	*Mesua ferrea*	*Lytharacea*	Stamens	94
7.	*Krishnajeeraka*	*Carum carvi*	*Umbelliferae*	Fruit	94
8.	*Sugandh bala*	*Coleus vettiveroides*	*Lamiaceae*	Root	94
9.	*Nalika*	*Cinnamomum tamala*	*Nelumbonacea*	Stem Bark	94
10.	*Bibhitaka*	*Terminalia belerica*	*Combretacae*	Fruit	94
11.	*Manjistha*	*Rubia cordifolia*	*Rubiacea*	Stem	94
12.	*Sarshapa Taila*	*Brassica campestris*	*Brassicacea*	Seed oil	6000
13.	Water				20000

Table no. 5 Showing the *Sneha Sidhi lakshana* during BST.

S. no	*Sneha siddhi lakshana*	*Kalka*	*Taila*
1.	*Shabda hino agni nikshipta*	+	+
2.	*Phenashanti*	+	-
3.	*Gandha varna rasotpatti*	+	-
4.	*Syav eva niryase*	-	+
5.	*Madhye darvi vimunchati*	-	+
6.	*Vartivat kalka*	-	+

Table no.6 Showing the ingredient of *Brihatsindooradya Malhar* (*BSM)*

S. No.	Ingredient	Quantity (%)	Quantity (g)
1.	Bees wax	01.25	62.50
2.	Emulsifying wax	02.50	125.00
3.	Paraffin wax	01.25	62.50
4.	Ceto stearyl alcohol	01.50	75
5.	Cetyl alcohol	01.00	50
6.	Stearic acid	01.50	75
7.	Glycerol mono stearate (GMS)	02.00	100
8.	Iso propyl alcohol (IPA)	03.00	150
9.	Active part (BST)	25.00	1250
10.	Methyl paraben sodium (MPS)	00.50	25
11.	Distilled water	59.50	2975
12.	Colour	00.50	25
13.	Fragrance (Chandan Fr.)	00.50	25
Total		**100 %**	**5000 g**

Fig 1 Pharmaceutical images of *Sasarpa tail murcchana*, BST, BSM

A. ORGANOLEPTIC CHARACTERS

Table no. 6 organoleptic examination of following samples of BST and BSM

S.no.	Organoleptic parameters	BST	BSM
1.	Appearance	Thick viscous	Thick and stick mass
2.	Colour	brown	Pink
3.	Odour	Characterstic	Characerstic
4.	Taste	----	----

C. PHYSICOCHEMICAL ANALYSIS

Table no. 7: Showing the physicochemical parameters of *BST & BSM Samples*.

S. No	Parameters	BST	BSM
1.	Organoleptic parameters		
	Appearance	Thick viscous	Thick and stick mass
	Colour	Brown	Pink
	Odour	Characteristic	Characteristic
	Touch		
2.	Physico-chemical analysis		
	pH	Not detected	6
	Specific gravity	0.876	Not detected
	Refractive index	72	Not detected
	Viscosity	44.55 cP	3800 cP
	Mineral *Taila*	Absent	Absent
	Unsaponifiable matter	1.18	7.57
	Rancidity	Absent	Absent
	Iodine value	23.03	80.98
	Acid value	0.05 mg KOH/g	0.71 mg KOH/g
	Peroxide value	3.30 m eq of O2/Kg	1.19 m eq of O2/Kg
	Saponification value	12.82 mg KOH/g	110.47 mg KOH/g
	Ester value	12.77	109.76
	Free fatty acid	0.02	0.35
	Total fatty matter	96.71 % w/w	28.66 % w/w
	Spreadability	3.0	4.0
	Therma stability (at 5, 25, 45oC) for 5 days	Stable	stable
	HPTLC		

3.	Total aflatoxins		
	Aflatoxin B1	BLQ (LOQ 0.008) mg/Kg	BLQ (LOQ 0.008) mg/Kg
	Aflatoxin B2	BLQ (LOQ 0.008) mg/Kg	BLQ (LOQ 0.008) mg/Kg
	Aflatoxin G1	BLQ (LOQ 0.008) mg/ Kg	BLQ (LOQ 0.008) mg/Kg
	Aflatoxin G2	BLQ (LOQ 0.008) mg/Kg	BLQ (LOQ 0.008) mg/Kg
4.	Microbiological analysis		
	Total bacterial count	<10 cfu/g	<10 cfu/g
	Total fungal count	<10 cfu/g	<10 cfu/g
	Enterobacteriaceae	<10 cfu/g	<10 cfu/g

Figures 1, 2, 3 Showing visualization of BST at 254nm,366nm and 510 nmrespectively

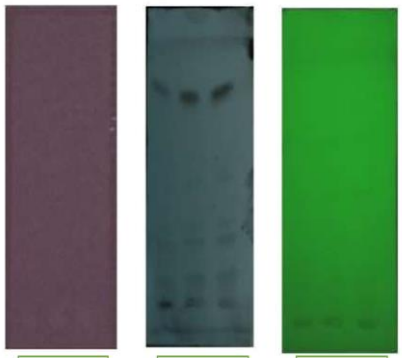

Fig. 4.1 Fig. 4.2 Fig. 4.3

Figures 4, 5, 6 Showing visualization of BSM at 254nm,366nm and 510 nmrespectively

Fig. 4.4 Fig. 4.5 Fig. 4.6

Table No 5: Showing the results of HPTLC of *BST & BSM*.

Sample	**254 nm**	**366 nm**	**510 nm**
BST	11 spots visualize	5 spots visualize	10 spots visualize
BSM	11 spots visualize	5 spots visualize	10 spots visualize