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Quality Control Evaluation of an Ayurvedic Medicated Oil: *Dhaturapatradi Taila*

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ABSTRACT

Background: *Dhaturapatradi Taila* is a *Sneha Kalpana*, indicated in *shirogata kandu* and *Keshachyuti*. In present study, it has been used for external application in *Kesha Roga*. **Objective:** Present study is aimed to look out on raw drug used in the preparation of *Dhaturapatradi Taila* and standardization of pharmacognostical, physicochemical parameters, HPTLC analysis and antimicrobial evaluation. **Methods:** Identification and authentication was done by pharmacognostical study i.e., Organoleptic characters and microscopy. Physicochemical evaluation, HPTLC analysis and antimicrobial study were carried out for final product. **Results:** Microscopical characters of *Datura* i.e. lamina, collenchymas and multicellular glandular head, prismatic crystal, rosette crystal, lower epidermis, vascular bundle, lignified xylem, anisocytic were found in pharmacognosy study. Physicochemical evaluation of medicated oil was showed results specific gravity 0.939, Ph 5.4, Refractive Index 1.487, Acid Value 1.5445, Saponification Value 202.43, and Iodine Value 109.98. High Performance Thin Layer Chromatography results in to 9 and 5 spots at 254nm and 366 nm before spray respectively. Significant anti fungal activity was obtained against the two funginamely, *Aspergillus brasiliensis* and *Candida albicans*. The medicated oil gave anti bacterial activity against *Staphylococcus aureus*. **Conclusion:** Identification, authentication of herbal drug used in the preparation and physicochemical evaluation has been carried out of prepared drug which is further useful for standardization of *Dhaturapatradi Taila* and other researches.

KEYWORDS

Antimicrobial study, Dhatura Patradi Taila, Hairfall, Pharmcognosy, Standardization



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INTRODUCTION

DhaturaPatradi Taila is one of the herbal formulation which prescribed in Ayurvedic text *Sahasrayogam- Taila Prakarana*¹. This preparation contains single herbal drug (*Dhatura*) *Dhaturapatra swarasa* is used as *Drava dravya* and *Tila Taila* as *Sneha dravya*. The *paka* of formulation was done for three days as per classics². It is specially indicated as in *Keshagata Roga*. *Dhaturapatradi Taila* is an Ayurvedic hair oil used for scalp itching, dandruff, and hair fall. It basically improves the scalp skin health and strengthens the hair root. Present study, is focus to develop quality parameters of *Dhaturapatra Taila* on the basis of pharmacognostical study, physicochemical parameters, chromatographic evaluation and anti-microbial study. Hence, there is a need of standardization of quality parameters. Therefore, the present study was designed to evaluate the quality parameters of *Dhaturapatradi Taila*.

Table 1 Formulation composition: *DhaturaPatradi Taila*

Sr. No.	Dravya	Name of Ingredient	Latin Name	Part Used	proportion
1	Kalka	Dhaturapatrakalka	Daturametel	Leaf	1part
2	Sneha	TilaTaila	Seasemumindicum	Seed oil	4part
3	Drava	DhaturaPatrasvarasa	Datuametel	Leaf	16part

Table 2 Organoleptic characters of *DhaturaPatradi Taila*

Sr no.	Various parameters	Results
1	Colour	Dark brown
2	Odour	Pungent
3	Taste	Not applicable
4	Touch	Smooth, Non gritty
5	Texture	Liquid

MATERIALS & METHODS

Collection, identification, authentication of raw drugs

Collection of raw materials

Dhatura leaves were collected from botanical garden Gujarat Ayurved University, Jamnagar and authenticated at Pharmacognosy Laboratory, IPGT & RA and Jamnagar (Figure no 1).



Figure 1 Raw *DhaturaPatra*

Tila Taila was procured from Pharmacy, GAU. Formulation composition was mentioned in Table 1.

Identification was done on basis of organoleptic characters (Table No 2) and microscopy as per API standards for authentication³. *Dhaturapatradi Taila* was



stored in well filled closed glass containers away from the light.

Preparation of *Dhaturapatradi Taila* in Bhaishajya Kalpana Laboratory of IPGT & RA. Preparation of *Kalka*:

Fresh leaves of *Datura* were taken and washed with water. Then, leaves were subjected into electrical mixer grinder with adding of sufficient quantity of water and grinded till a paste (*Kalka*) was prepared (Figure: 2).

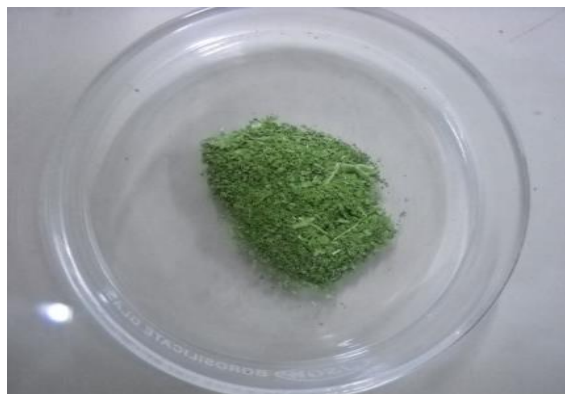


Figure 2 *DhaturaPatra kalka*

Boluses were kept in stainless steel vessel for further *Tailapaka* process.

Preparation of *Dhaturapatradi Taila*: 1 l of *Tila Taila* was taken in a stainless steel vessel and heated over mild flame (80°C for 5 min) till complete evaporation of moisture and then boluses of *Kalka* were added in it. After mixing of *Kalka*, 4 l of *Dravadravya (Dhaturapatra Swarasa)* was added and heating was continued to maintaining the temperature in between 95-100°C. The mixture of *Tila Taila* and *kalka* were left in undisturbed stage through the

night and heating was given for 3days (average 6 hr 15 min). Contents were stirred continuously to avoid the possibility of settling down. Heating was continued on 3rd day till *Sneha siddhi Lakshana* were obtained. After obtaining desired *Sneha Siddhi Lakshana*, the vessel was taken out from heat and oil was filtered through two folded cotton cloth in its hot stage. The prepared oil was stored in a properly labeled air tight bottle after self cooling. These *Sneha sidhhi* parameters of completion tests may also be used as distinguish criteria for quality control of products⁴.

Pharmacognostical Study: Raw Drug used was identified and authenticated by pharmacognosy department, IPGT & RA, Gujarat Ayurved University and Jamnagar. The identification was carried out on the basis of microscopic study, organoleptic characters of herbal drug.

Pharmaceutical Evaluation

Physicochemical Parameters: *Dhaturapatradi Taila* was analyzed by using qualitative and quantitative parameters at Pharmaceutical Laboratory, IPGT & RA, Gujarat Ayurved University and Jamnagar. The common parameters mentioned in Ayurvedic Pharmacopeia of India⁵ and CCRAS guidelines⁶ i.e. refractive index⁷, Specific gravity⁸, Acid



value⁹, Iodine value, Saponification value¹⁰ were taken.

High Performance Thin Layer Chromatography (HPTLC):

Sample preparation: 0.1ml of oil was taken and 1ml of hexane was added. This Solution was prepared to use for chromatography. Thereafter pre chromatographic derivatization was done. Alcoholic KOH (base) and thereby heated for 10-15 minutes in CAMAG TLC plate heater. Sample application was done using CAMAG linomat 5. HPTLC of *Dhaturopatradi Taila* was carried out using the solvent system Petroleum Ether: Diaethyl Ether: Acetic Acid (9:1:0.1v/v). This study was performed for the normal phase separation of product's components. Post chromatographic derivatization was done with vanillin sulphuric acid spray reagents.

OBSERVATIONS AND RESULTS

Organoleptic characters: The observations for the organoleptic evaluation were reported in Table 2

Table 2 Organoleptic characters of *Dhaturopatradi Taila*

Sr no.	Various parameters	Results
1	Colour	Dark brown
2	Odour	Pungent
3	Taste	Not applicable
4	Touch	Smooth, Non gritty
5	Texture	Liquid

where it was found that formulation was dark brown in colour with a pungent odour, smooth and non gritty touch.

Pharmacognostical analysis: Microscopy of finished product was done by studying under the Carl Zeiss Trinocular Microscope before and after staining with phluoroglucinol and concentrated HCL to study the characters of drug. The microphotographs were taken by a camera attached with the microscope as given below. The diagnostic characters were found under microscope showed lamina, collenchyma, multicellular glandular head, prismatic crystal, rosette crystal, lower epidermis, vascular bundle, lignified xylem, anisocytic of *Dhaturo*.(Plate no:1)

Plate no 1 : Microphotographs of *Dhaturopatradi taila*

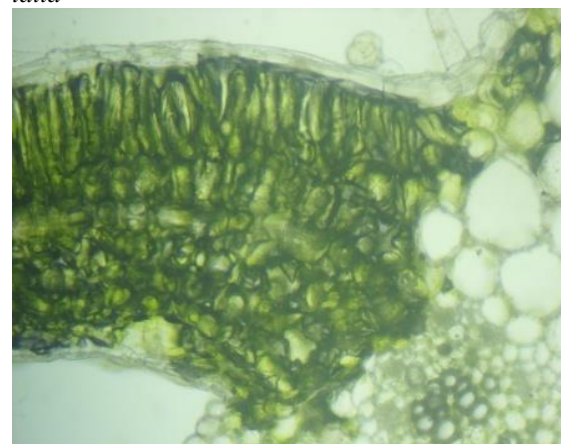


Figure 1(a) Lamina



Figure 1(b) Collenchyma



Figure 1(c) Multicellular glandularhead

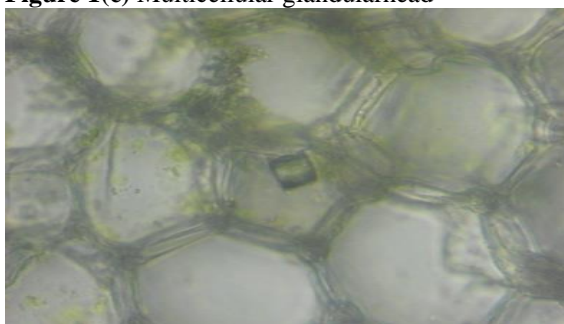


Figure 1(d) Prismatic crystal

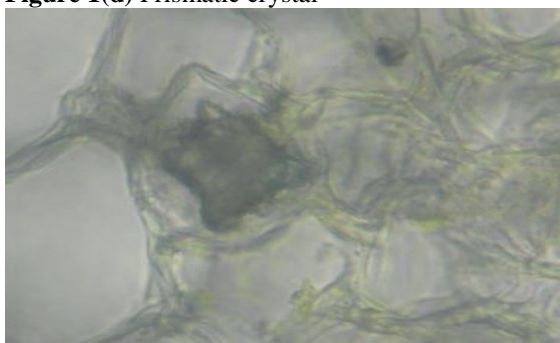


Figure 1(e) Rossette crystal

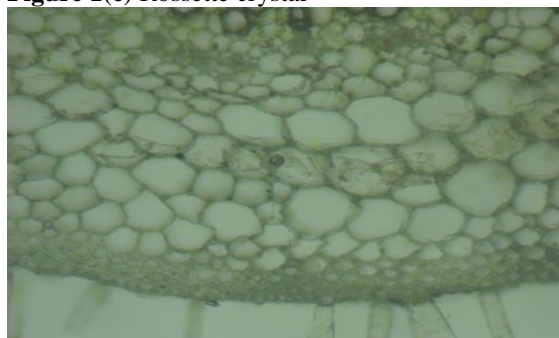


Figure 1(f) Lower epidermis

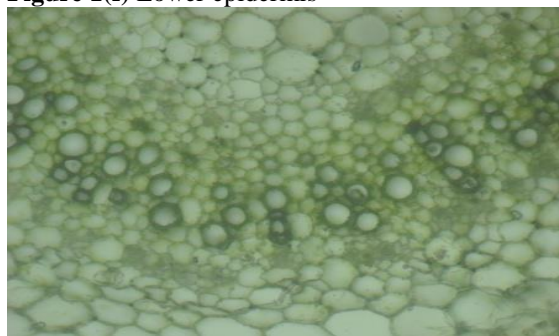


Figure 1(g) Vascular bundle

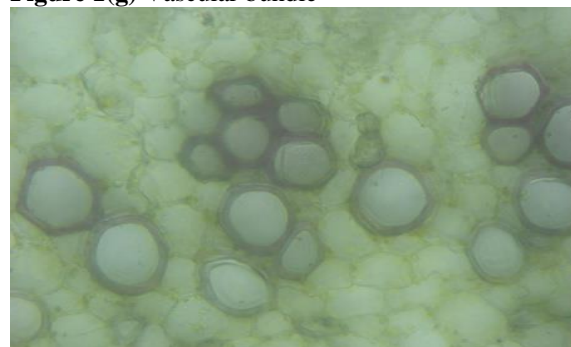


Figure 1 (h) Lignified xylem

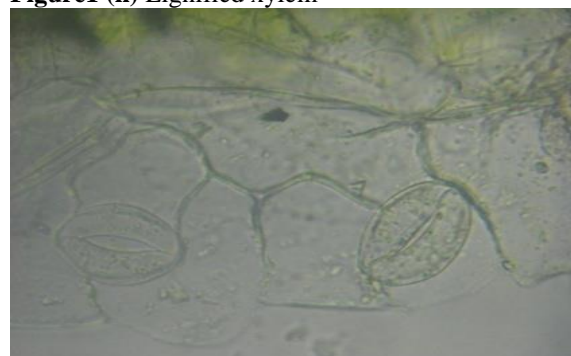


Fig 1(i) Anisocytic stomata

Pharmaceutical Analysis: The observations for the physicochemical analysis of *Dhatrapatradi Taila* were reported in Table 3

Table 3 Physicochemical Parameters of *Dhatrapatradi Taila*

Parameters	Results
Specific gravity	0.939
Ph	5.4
Refractive index	1.487
Acid value	1.5445
Iodine value	109.98
Saponification value	202.43

Where it was found that formulation have all the values within the standard limits.

Table 4 Results of *Dhatrapatradi Taila*

Solvent System : Hexane : Diethyl ether (7 : 3)			
S	Conditions	No.of Spots	R _f Value
1	Short UV- 254 nm	9	0.03, 0.05, 0.16, 0.25, 0.30, 0.38, 0.48, 0.89, 0.95
2	Long UV- 366 nm	5	0.04, 0.11, 0.16, 0.26, 0.96



HPTLC Study: Chromatographic separation of the contents from the finished product was reported in Table no: 4.

TLC profile consists of 9, 5 spots at 254 nm and at 366nm before spray respectively (Figure no: 3).

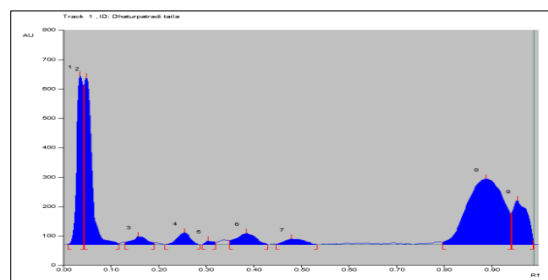


Figure 3 (254 nm)

Table 4 Results of Antibacterial activity of *Dhatrapatradi Taila*

Sr no.	Test Sample	Amount of extract added each well(in ul)	Amount of organism added in media (in ul)	Zone of inhibition(in mm)
Against S. aureus				
1	<i>Dhatrapatradi Taila</i>	300	100	14 mm
Against C. albicans				
2	<i>Dhatrapatradi Taila</i>	300	100	19 mm
Against A. brasiliensis				
3	<i>Dhatrapatradi Taila</i>	300	100	18 mm

Antimicrobial Study: Significant antibacterial activity of formulation was obtained with zone of inhibition against gram positive bacteria i.e. *S. aureus*. Antifungal activity was obtained against two fungi namely *C. albicans*, *A. Brasiliensis* which were presented in Table no: 4.

DISCUSSION

In the present research work, only suitable and available techniques were selected for the quality evaluation of *Dhatrapatradi Taila*. Generally, *Taila* are given different characteristic color and odor relative to the herbs and other materials which were used to prepare the medicated *Taila*. This medicated *Taila* is dark brown viscous liquid with pungent odor. The

pharmacognostical evaluation showed microscopical characters i.e., lamina, collenchyma, multicellular glandular head, prismatic crystal, rosette crystal, lower epidermis, vascular bundle, lignified xylem and anisocytic of *Dhatura*. This shows the purity and quality of product.

Evaluation of Physico-chemical parameters and qualitative analysis helps to assess the quality and identify the presence of specific ingredients in a formulation and also to assess the purity by comparing with the standard ones. Refractive index indicates the density of sample compared to air and liquid media; the value (1.487) of medicated *Taila* was within the limitⁱ. Specific gravity indicates the presence of solute content in the solvent; the value (0.939) for the same was appropriate for



this *Taila*¹¹. The amount of alkali needed to saponify a given quantity of *Taila* will depend upon a number of -COOH group present. Saponification value of *Dhaturopatradi Taila* was found to be 202.43 mg/g. The Acid value indicates the presence of free fatty acid in the *Taila* which is responsible for rancidity of compounds; higher the free fatty acid more is the rancidity, this helps to decide the shelf life of the *Taila*; acid value for *Dhaturopatradi Taila* was found to be 1.5445 thus indicating the longer shelf life of *Taila*. Iodine value indicates the degree of unsaturation of *Taila*; greater the degree of unsaturation higher will be the possibility of absorption and atmospheric oxidation leading to rancidity¹². The more iodine number, the more unsaturated fatty acid bonds are present; unsaturated fatty acid better absorbed than saturated fatty acids, the iodine value of *Dhaturopatradi Taila* was found to be fair enough which indicates the less rancidity of this formulation¹³.

A gram negative, gram positive and two fungi were used for the anti microbial assay¹⁴. It was found that significant anti fungal activity was obtained against the two fungi namely, *Aspergillus brasiliensis* (ATCC-16404) and *Candida albicans* (ATCC-10231) with the zone of inhibitions of 18 mm and 19mm respectively of oils.

The oil gave anti bacterial activity against *Staphylococcus aureus* (ATCC-6538), a gram positive bacterium, with zone of inhibition measuring 14 mm. There was no activity seen against the gram negative bacteria *Escherichia coli* (ATCC-8739).

HPTLC method was developed in order to separate it from other interfering phytochemical constituents of formulation. This was achieved on HPTLC plates using petroleum Ether: Diethyl Ether: Acetic Acid (9:1:0.1v/v) as a mobile phase. In HPTLC of *Dhaturopatradi Taila*, nine major spots were observed at 254 nm (Table 5, Figure 4)

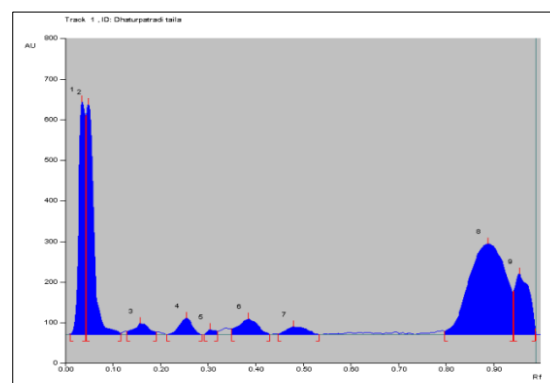


Figure 4 (254 nm)

Table 5 Results of *Dhaturopatradi Taila*

Solvent System : Hexane : Diethyl ether (7 : 3)

S	Conditions	No.of Spots	R _f Value
1	Short UV- 254 nm	9	0.03, 0.05, 0.16, 0.25, 0.30, 0.38, 0.48, 0.89, 0.95
2	Long UV- 366 nm	5	0.04, 0.11, 0.16, 0.26, 0.96

indicating its possible compounds of the matrix which may be responsible for its therapeutic activity. TLC finger print profile



consists of 9,5 prominent spots under UV light at 254nm and 366nm respectively before spray. These findings could be helpful in identification and authentication.

CONCLUSION

Present study reveals that quality of *Dhaturopatradi Taila* as per pharmacognostical and physicochemical parameters, which helps in justifying the quality of formulation and reaches the desired quality. In the present work, the obtained results were found within normal prescribed limits. For first time; this profile of *Dhaturopatradi Taila* was established. On the basis of observations and experimental result, the evaluation of research of this *Dhaturopatradi Taila* may be used as standard reference for further quality control research works and clinical studies



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