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An Evaluation of Quality Control Parameters for *Yashti Madhuka Taila*

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***Abstract*—*The study of standardization of herbal drugs depends on reliable, specific & sensitive quality control method used in a combination of classical & modern instrumental method. Yashti Madhuka Taila is an ancient Ayurvedic oil based formulation. It is prescribed for Palita (graying of hair), Kespatana (falling of hair) & Smasru patana (falling of beared & maustache). Though Yashti Madhuka Taila is age old formulation, not much attempt has been towards in its standardization. The aim was to standardize Yashti Madhuka Taila using modern Bioanalytical tools. The formulation was analyzed for phytochemical & biochemical constituents like Carbohydrates, Proteins, Tannin, Alkaloids & Glycosides. Yashti Madhuka Taila is also subjected to preliminary Phytochemical, Physicochemical, IR spectroscopy & chromatographic characters*.

***Keywords*—** *Yashti Madhuka Taila, Standardization, Ayurvedic formulation*.

I. INTRODUCTION

Vedas are the oldest kind of literature on plants and their medicinal uses in different forms. Medicated oils are one of the most widely used medicinal form for external application as well as internal usage to cure many ailments related to skin. These oils have been found far superior to their allopathic counterparts. Yashti Madhuka Taila is one amongst such oil which is used as a remedy for hair related disorders like Palita (graying of hair), Keshpatana (falling of hair) and Smasru Patana (falling of beard and moustache). Yashti Madhuka Taila is prepared from Tila Taila, Amlaki Svarasa (juice of fresh macerated Amla), Kshira (Cow's milk) and Kalka of Yashti (table 1).

In Ayurvedic medicinal preparation, a drug formulation or design may not be a problem, because many formulations are well documented in classical texts. But, there is confusion with respect to standards to be followed while preparing a formulation as well as basic parameters to assess the quality of the finished product.

In order to assess the quality of Yashti Madhuka Taila,it was prepared at laboratory scale as per pharmacopoeial standards and it was subjected to various quality control tests. Gallic acid, a bioactive marker reported to have antioxidant, anti-inflammatory and anticancer properties, is among the active components found in plant ingredients used for the preparation of YMT.

II. MATERIALS AND METHODS

1. Raw Materials, Chemicals and Reagents

Plant Raw materials used for the preparation of Yashti Madhuka Taila were procured Ayurvedic Proprietory Medicines Shop (Mumbai) with the knowledge of Ayurvedic physician. The materials were processed as per the standard guidelines and stored in air tight containers. The Gallic Acid standard was procured from Himedia and Assigned purity: 98%.

2. Quality Evaluation of Raw materials

Raw materials powders of Yashti and Amalaki were analyzed microscopically for their quality.

3. Preparation of Yashti Madhuka Taila

TABLE 1. Formulation composition

Sr.No.	Ayurvedic Name	Botanical identity	Quantity
1	Tila Taila	Oil from seeds of *Sesamum indicum* L.	8 parts
2	Yashti	Root of *Glycyrrhiza glabra* L	1 part
3	Kshira/Godugdha (Cow's milk)	-	32 parts
4	Amalaki Swarasa	Pericarp of *Phyllanthus emblica* L.	32 parts

- *Preparation of Kalka of Yashti and Amlakiswarasa*

1 part powder of yashti in sufficient amount of water to make a paste.

- *Amlaki Swarasa*

32 parts of coarse powder of amlaki is added to water [8 times to weight of amlaki] Heated on mild flame until the volume of water reduced to one fourth of original.Filter through muslin cloth in hot condition and filter is used as amlakiswarasa.

- *Preparation of YashtimadhukaTaila:*

760ml of Tila taila is indirectly heated on mild flame 80°-90°C. Add yashti kalka [paste] and amla swarasa. This mixture was stirred intermittently till the kalka becomes slimy. As soon as it becomes slimly heating is stopped and milk is added and it is kept standing overnight. Next day the mixture is heated indirectly on mild flame till it attains Sneha siddhi lakshanas [completion test for chief desired characteristics like Gandhavarna – Rasotpatti [desired smell, colour and taste , no cracking sound, appearance of froth, paste of herbal drugs can be rolled in between fingers.] The mixture is filtered when hot.

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4. Quality Evaluation of YashtimadhukaTaila:

- *Organoleptic evaluation :*

The formulation was studied for its preliminary characters like colour, appearance and odour.

- *Preliminary Phytochemical and Biochemical Evaluation*

Phytochemical screening of some major secondary metabolites (Flavonoids, Tannins, Alkaloides, Glycosides ,Terpenoids,Steroids, Phlobatannin, Phenolic Compounds and Saponins) and Biochemical for Carbohydrates ,Proteins and Fats in Yashti Madhuka Tailawas carried out by performing preliminary colour based tests.

- *Physicochemical Evaluation :*

The prepared formulation was subjected for physicochemical studies Acid value, Saponification value and Specific gravity.

- *Chromatographic Evaluation:*

Preparation of Standard:

Gallic Acid standard was prepared in methanol with initial concentration of 1000 ppm.Further dilution of 100 ppm was prepared using mobile phases.

Preparation of Sample:

All the raw materials and prepared formulation powders were dissolved in Methanol and kept overnight. Next day al the solutions were filtered through whattman filter paper to obtain clear extracts.

- *High Perfiormance Thin Layer Chromatography(HPTLC) Fingerprinting :*

10 µl of the filtered solution of formulation extract and standard was applied on the TLC plate as per condtions mentioned in table 1a followed by development, derivatizing with vanillin sulphuric acid agent and scanning at 513 nm.

TABLE 1a. Chromatographic Conditions for HPTLC:-

Stationary Phase	HPTLC plates silica gel 60 F 254
Plate size	10.0x10.0 cm
Mobile Phase	Ethyl Acetate : Methanol : water (40.48 : 5.46 : 4.04)
Saturation Time	20 min.
Standard Used	100 ppm Gallic Acid
Spot Volume	10 µl
Band Length	8.0mm
Solvent Front	80mm
Wavelength and Lamp	366nm & Mercury lamp
Sample Applicator	CAMAG Linomat 5
Sample Detection	CAMAG Visualizer : 200480
Number of Tracks	7

- *High Performance Liquid Chromatography(HPLC) evaluation :*

HPLC was also performed to find out the Gallic acid content in prepared formulation as per conditions mentioned in table 1b.

TABLE 1b. Chromatographic Conditions for HPLC:-

Mobile phase	Acetonitrile : water (20:80) [pH 3 by ortho phosphoric acid]
Stationary Phase	C_{18} (4.6 × 250 mm, 5 µm).
Flow rate	1 ml/min
Injection volume	20 µl
Detection	UV at 272nm

- *FTIR*

Spectroscopic analysis was done for prepared formulation was done using JASCO FTIR.

III. Results and Discussion

Different quality control parameters of Yashti Madhuka were analyzed as a part of its standardization. Powder microscopy is one of the most important analysis to evaluate key analtomical characters and to check for any impurities present. The data of powder microscopy for Yashti Madhuka taila is presented in table 2. The Organoleptic characters were checked and results are presented in table 3. Physicochemical parameters like Specific gravity, Acid value, Saponification value were determined and the values obtained were found to be normal (table 4). Qualitative tests for Phytochemical evaluation helped to understand the presence of various therapeutically active constituents in Yashti Madhuka Taila and it was found to be having important phytoconstituents like alkaloids, Saponins and steroids (table 5). These Chemical constituents could have pharmacological action on their own or in conjugation with other constituents in terms of efficacy, which possibly help the body to fight with ailment.

The prepared formulation was further evaluated by analytical techniques like HPTLC, HPLC and FTIR for presence of marker compound Gallic acid. HPTLC fingerprinting data clearly indicates that gallic acid is present in all the raw materials and formulation and this can be used to perform stability studies of this formulation (Fig. 1). HPLC analysis data was also aligned with data obtained by HPTLC and formulation was found to be having marker compound gallic acid with significant quantity (Fig. 2). FTIR spectra helps to understand the presence of some chemically important functional groups which may play important role in therapeutic activity of the formulation.(Fig. 3)

IV. Conclusion

Asseseement of quality control parameters has a very vital role in standardization of traditional medicine in order to make them at par with modern medicines. In order to have uniformity the production of these medicines on large scale and to achieve reproducible quality control data, there is a need to set a standard protocol for preparation and for assesment. Ayurvedic classical preparation, Yashti Madhuka Taila was prepared at laboratory level and has been screened for different quality control properties using the various modern scientific quality parameters. The results obtained can be used as reference while setting the pharmacopoeial standards for Yashti Madhuka Taila to ensure the quality of the medicine. Stability studies are need to be performed as per the standard guidelines.

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TABLE 2. Powder characteristics observed

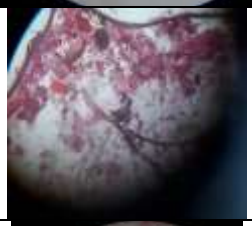
Yashti	Field diagram	Amlaki	Field diagram
Fibre		Fibre	
Calcium oxalate crystals		Raphides	
Xylem		Pitted Xylem	
Cork cell		Starch and venation pattern	

TABLE 3. Organoleptic Characters

Sr. No.	Characters	Yashti Madhuka Taila
1	Colour	Reddish yellow
2	Appearance	Oily
3	Odour	Pleasant

TABLE 4. Physicochemical evaluation

Sr. No.	Parameters	Yashti Madhuka Taila
1	Acid Value	0.15 %
2	Saponification Value	18.2 kg
3	Specific Gravity	6.98 %

TABLE 5. Phytochemical Evaluation

Sr No.	Tests	Observation	Results
1	Tannin: 1ml Aq. Extract + 0.1% $FeCl_3$ dropwise	Brownish green or Blue black colour	-
2	Alkaloids: 1ml Alc. Extract + 1ml conc. HCl + Hager's Reagent	Yellow ppt	+
3	Glycosides: 1ml extract + 0.5ml Glacial Acetic acid + few drops of Dil. $FeCl_3$ till colourless + 1ml Dil. H_2SO_4	Brown Ring	-
4	Flavonoids: 1ml extract+ 1ml Dil. ammonia solution + Conc. H_2SO_4	Yellow colour disappear	-
5	Steroids: 1ml extract + 1ml chloroform + Conc H_2SO_4	Red colour after stand	+
6.	Phlobatannin: 0.5ml aq. Extract+ Boil with 1ml 1% HCl	Ppt present	-
7.	Phenolic Compounds: 1ml extract + dropwise $FeCl_3$	Violet colourppt	-
8.	Saponin: 1ml extract + Few drops of olive oil+ Shake vigorously	Froth	+
9.	Terpenoids: 1ml extract +0.5ml $CHCl_3$+ 1ml Conc. H_2SO_4	Yellow colour	-

Key : + positive, - Negative

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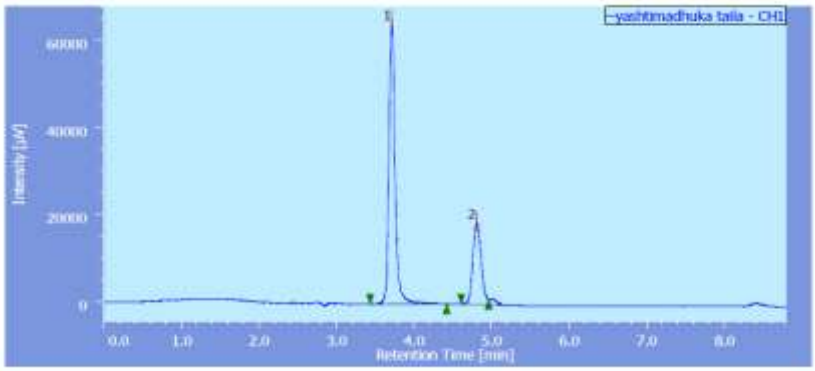
Fig. 1. HPTLC fingerprint

solvent front : 6.5 cm

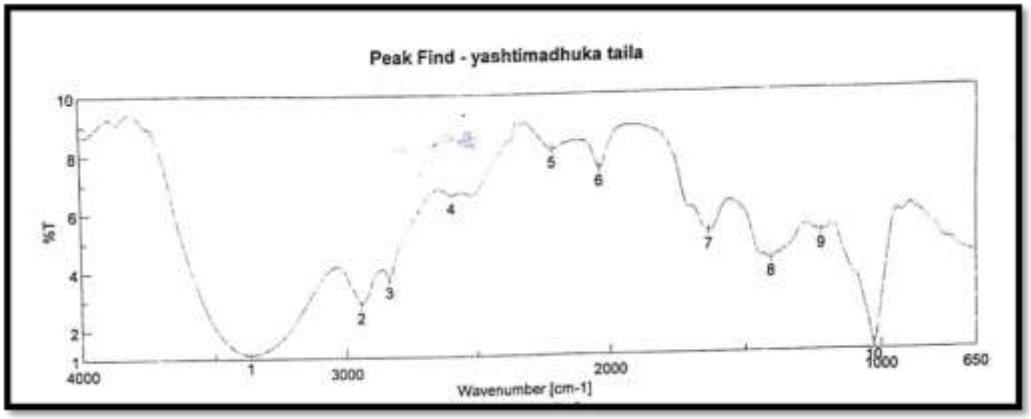
Track No.	Sample Name
1	Gallic Acid
2	Yashti
3	Amalaki
4	Formulation

Fig. 2. HPLC Analysis



#	Peak Name	CH	tR [min]	Area [uV sec]	Height [uV]	Area%	Height%	Quantity	NTP	Resolution	Symmetry Factor
1	gallic acid	1	3.708	360248	64928	71.833	77.551	N/A	12038	6.602	1.237
2	Unknown	1	4.800	141257	18796	28.167	22.449	N/A	9560	N/A	N/A

Fig. 3. FTIR Analysis



Position	Wave number	Functional Group
3600 – 2800	8367.1, 2942.84, 2834.85	Alcohol, Aldehydes, Carboxylic Acid
2600 - 2000	2600.54, 2222.56, 2044.17	Carboxylic acid
1600 – 1000	1638.23, 1407.78, 1223.61, 1027.87	Aromatic ring, Acid Salt, Carboxylic Acid

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