

PHARMACOGNOSTICAL AND PHYTOCHEMICAL EVALUATION OF TRIPHALAGUDUCHYADI VATI: AN EFFECTIVE FORMULATION FOR OBESITY

Biju K.R*, Shukla V.J., Harisha C.R., Patel K.S., Rajagopala S.
IPGT&RA, Gujarat Ayurved University, Jamnagar, India

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*Corresponding author

Ph.D. Scholar, Email: drbijukr@yahoo.co.in

ABSTRACT

Childhood obesity is one among the most serious public health challenges of the 21st century. Lots of single and compound drugs have been described in Ayurvedic classics for the management of Obesity. Triphalaguduchyadi churnna is one among them and is very safe to be used in children. The drug having *Kaphamedohara* and *lekhana* properties is effective in *Sthaulya* (Obesity). Tannin, the main chemical constituent of the drug regulates food intake and is a proven hypolipidaemic agent. To overcome the problems of palatability, feasibility, shelf life with the churnna form of drug, an effort is made to convert it into convenient tablet form. This paper is prepared with a view to standardize the product through pharmacognostical and pharmaceutical measures. The compound was analyzed and standardized scientifically through qualitative and quantitative analysis by physico-chemical parameters, Thin Layer Chromatography (TLC), High Performance Thin Layer Chromatography (HPTLC) and pharmacognostical measures. Pharmacognostical analysis showed characteristics of all the ingredient drugs in the tablet. Pharmaceutical analysis revealed the presence of tannin, glycosides and flavonoids with tannin as the main constituent that accounts 34.26%w/w of the compound. TLC and HPTLC were carried out after organizing appropriate solvent system in which 8 and 7spots were distinguished in TLC and HPTLC respectively. It is inferred that the formulation meets the minimum qualitative standards as reported in the API at a preliminary level. The inference from this study may be used as reference standard in the further quality control researches.

Key Words: Ayurveda, Obesity, Triphalaguduchyadi vati, Pharmacognosy, Pharmaceutical

INTRODUCTION

Obesity is reported as the second leading cause of preventable deaths¹. The problem is global and is steadily affecting even the low- and middle-income families, particularly in urban settings. According to the latest report of WHO 1.5 billion adults - more than one in ten of the world's adult population - are obese and 43 million children under five are overweight². Overweight and obese children are likely to stay obese in adulthood and cause a major risk for serious diet-related chronic diseases including type II Diabetes, Cardiovascular disease, Hypertension, Stroke and certain forms of Cancer³. At least 2.8 million adults die each year as a result of being overweight or obese and 44% of the diabetes, 23% of the ischemic heart disease and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity². Mental health consequences of obesity in children include social stigmatization and depression⁴. Thus obesity reduces the overall quality and span of life of the affected children.

Atisthula is classified as one among the eight censurable physiques by Acharya Charaka⁵. In *Sthaulya*, dhatus are not uniformly formed, but with an immensity of medo dhatus with agni vaishamya⁶. The treatment should be aimed to normalize kapha, vata, medas and agni⁷. Though, reduced calorie intake and increased physical activity are the primary steps in the management, various formulations also are available in Ayurvedic classics for the treatment of *Sthaulya*. Triphalaguduchyadi churnna is one among them and is very safe to be used in children^{8,9}. The drug having *kaphamedohara* and *lekhana* properties, would be effective in *Sthaulya* (Obesity)¹⁰. Tannin, the main chemical constituent of the drug reduces feed intake and is a proven hypolipidaemic agent¹¹. To overcome the problems of palatability, feasibility, shelf life with the churnna form of drug, an effort was made to convert it into convenient tablet form. This paper is prepared with a view to standardize the product through pharmacognostical and pharmaceutical measures.

Aim of the study

Pharmacognostical and Phytochemical analysis of Triphalaguduchyadi vati.

MATERIALS & METHODS

Plant Material

All the raw drug materials were collected from the pharmacy department, I.P.G.T. &R.A., Gujarat Ayurveda University, Jamnagar. The ingredients and the part used are given in table 1

Pharmacognostical Study

Raw drugs were identified and authenticated by the pharmacognosy department, I.P.G.T. &R.A., Gujarat Ayurveda University, Jamnagar. The identification was carried out based on the morphological features, organoleptic features and powder microscopy of the individual drugs. Later, pharmacognostical evaluation of the tablet was carried out. Tablets dissolved in small quantity of distilled water, filtered through filter paper, filtrate studied under the Corlzeiss microscope attached with camera, with stain and without stain. The microphotographs were also taken under the microscope.

Method of preparation of Triphalaguduchyadi vati

The ingredients enlisted in the table were made into fine powder and sieved in mesh no.80. The powder was mixed well in the mass mixing machine till a homogenous mixture was obtained. Sufficient quantity of water was added and mixed properly with the powder and made it into granules. 2% each of Talcum powder and Starch were added to the granules as binding agents.

Pharmaceutical evaluation

Physicochemical parameters

Triphalaguduchyadi vati was analyzed by using qualitative and quantitative parameters at Pharmaceutical Chemistry Laboratory of I.P.G.T.&R.A., Gujarat Ayurveda University, Jamnagar. The Common parameters mentioned for compressed tablets in Ayurvedic Pharmacopoeia of India¹² and CCRAS guidelines¹³ are total ash, pH value and water and alcohol soluble extractives. On its basis the parameters were selected. Presence of more moisture content in a sample can create preservation problem. Hence loss on drying was also selected as one of the parameters.

Thin Layer Chromatography study

Thin layer chromatography is mentioned as a primary tool for identification as part of monographs on all medicinal plants¹⁴. TLC is a technique in which a solute undergoes distribution between two phases, a stationary phase acting through adsorption and a mobile

phase in the form of a liquid. Depending on the solvent system, this helps fairly to distinguish the individual chemical constituents in the formulation by calculating the R_f value and a visual comparison of the size and intensity of the spots usually serves for semi-quantitative estimation.

Powder of Triphalaguduchyadi vati weighing 5 gm is taken with 100 ml of alcohol and kept for twenty-four hours. Filtrate was prepared and evaporated till it gets dried in a flat-bottomed shallow dish and concentrated on water bath to volume of requirement.

TLC plate (Silica gel G Pre-coated plates) was spotted with the sample and then run with the solvent systems [Toluene (7 ml), Ethyl acetate (2 ml), Acetic acid (1 ml)] separately. The resulting TLC pattern was viewed under long wave ultra violet light at 366 nm and short wave ultra violet light at 254 nm. Then 10% Ferric chloride reagent sprayed and dried in a hot air oven and the number of spots viewed under daylight.

High-Performance Thin Layer Chromatography Study

Methanol extract of Triphalaguduchyadi vati were spotted on pre-coated silica gel GF 60₂₅₄ aluminium plate as 5mm bands, 5mm apart and 1cm from the edge of the plates, by means of a Camag Linomat V sample applicator fitted with a 100 μ L Hamilton syringe. Toluene (7 ml), Ethyl acetate (2 ml), Acetic acid (1 ml) was used as the mobile phase. After development, Densitometric scanning was performed with a Camag T.L.C. scanner III in reflectance absorbance mode at 254 nm and 366 nm under control of win CATS software (V 1.2.1 Camag). The slit dimensions were 6 mm x 0.45 mm and the scanning speed was 20 mm s-1.

RESULTS AND DISCUSSION

Pharmacognostical study

The initial purpose of the study was to confirm the authenticity of the drugs used in the preparation of Triphalaguduchyadi vati. For that coarse powder of all the ingredients were subjected to organoleptic and microscopic evaluation separately. Results tallied with the API and thus confirmed the genuineness of all the raw drugs. Later, after the preparation of the tablet, pharmacognostical evaluation was carried out.

Organoleptic evaluation

Organoleptic features like colour, odour and taste of Triphalaguduchyadi vati were recorded and are placed at table 2.

Microscopic evaluation

Microscopic evaluation was conducted by powdering the tablet and dissolving it in the distilled water and studied under microscope for the presence of the characteristics of the ingredient drugs and for the probable changes in features if any. The microphotographs were taken by using Carl Zeiss binocular microscope. Characteristics of all the ingredient drugs were identified in *Vati* also. Details are placed at table 3 (Figure 1)

Physico-Chemical Parameters

Physico-Chemical parameters of the tablet like Uniformity, Disintegration time, Hardness, Loss on Drying were all found to be within the normal range. The water-soluble extractive and methanol soluble extractive values were found to be 31.12% and 30.64 % respectively. Details are shown at table 4.

Thin Layer Chromatography study

TLC pattern was developed when spotted TLC plate run with the solvent system. Maximum 8 spots were obtained when viewed under long wave ultra violet light (366 nm). 7 spots were obtained when 10% Ferric chloride reagent sprayed, dried and viewed under daylight. R_f values of the spots obtained were at a comparable level which indicates the presence of some definite constituents in the sample. Details are placed at table 5. (Figure 2)

High-Performance Thin Layer Chromatography Study

Densitometric scanning of the HPTLC pattern showed 7 spots corresponding to hRf values 04, 27, 34, 44, 58, 75, 87 in short wave UV 254 nm and 4 spots corresponding to hRf values 05, 34, 57, 74

obtained in long wave UV 366 nm (Figure 3). Though it may not be able to identify particular chemical constituent from the spots obtained, the pattern may be used as a reference standard for further quality control researches.

CONCLUSION

Ayurvedic system of Medicine is being relied upon more and more for the various health issues particularly lifestyle diseases. *Triphalaguduchyadi churnna* is a compound mentioned for Obesity in major classical texts of Ayurveda. Since it is used in children in the present study, to overcome the problems of palatability, and also considering the feasibility and shelf life, *churnna* form of drug was converted into tablet form.

The ingredients were identified and authenticated pharmacognostically and were used for the preparation. The formulation was subjected to pharmacognostical, physico-chemical, TLC and HPTLC studies. It is inferred that the formulation meets the minimum qualitative standards as reported in the API at a preliminary level. The inference from this study may be used as reference standard in the further quality control researches. Further clinical evaluation of the Compound is in progress.

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TABLE 1 INGREDIENTS OF TRIPHALAGUDUCHYADI VATI

Drug	Botanical name	Part used	Proportion
Haritaki	<i>Terminalia chebula</i> Retz.	Fruit	2 Part
Vibhitaki	<i>Terminalia bellerica</i> Roxb.	Fruit	1
Aamalaki	<i>Emblica officinalis</i> L.	Fruit	1
Guduchi	<i>Tinospora cordifolia</i> Miers.	Stem	1
Musta	<i>Cyperus rotundus</i> L.	Rhizome	1

TABLE 2 ORGANOLEPTIC FEATURES OF TRIPHALAGUDUCHYADI VATI

Sl. No.	Characters	Observed
1.	Colour	Light Grayish brown
2.	Odour	Agreeable
3.	Taste	Astringent-Bitter

TABLE 3 MICROSCOPIC CHARACTERS OF TRIPHALAGUDUCHYADI VATI

Sl.No.	Characteristics	Concerned Ingredient Drug
1.	Prismatic crystals	Guduchi, Musta, Aamalaki
2.	Trichomes (Simple), rosette crystals	Vibhitaki
3.	Tannin containing cells, stone cells	Haritaki
4.	Starch grains with hilum	Guduchi, Musta
5.	Pericyclic fibre, lignified fibers	Guduchi
6.	Fragment of Reticulate vessels	Musta
7.	Fragment of Pitted vessels	Guduchi
8.	Simple fibers, mesocarp cells, scleroids	Aamalaki
9.	Fiber with wide lumen	Musta
10.	Cork (Surface view)	Guduchi
11.	Mesocarp cells	Vibhitaki & Haritaki
12.	Lignified pitted parenchyma	Aamalaki

TABLE 4 PHYSICO CHEMICAL PARAMETERS OF TRIPHALAGUDUCHYADI VATI

Test	Results
Uniformity of Tablet	Average 511 mg
Highest	520 mg
Lowest	500 mg
Disintegration Time	1.5 mnt
Hardness	0.5 kg/c.m ²
Loss on Drying	4.65%w/w
Ash value	6.35%w/w
Water soluble extract	31.12%w/w
Methanol soluble extract	30.64%w/w
pH value (5% aqueous solution)	3.71
Percentage of Tannin	34.26

TABLE 5 TLC OF TRIPHALAGUDUCHYADI VATI

Extract	Solvent system	Spray	Wavelength	No. of Spots	Rf values
Methanol Extract	Toluene (7ml) : Ethyl acetate (2ml): Acetic acid (1ml)	-	366nm UV	8	0.24, 0.43, 0.60, 0.66, 0.72, 0.83, 0.90, 0.95
		10% FeCl ₃	Daylight	7	0.24, 0.31, 0.38, 0.59, 0.66, 0.72, 0.81

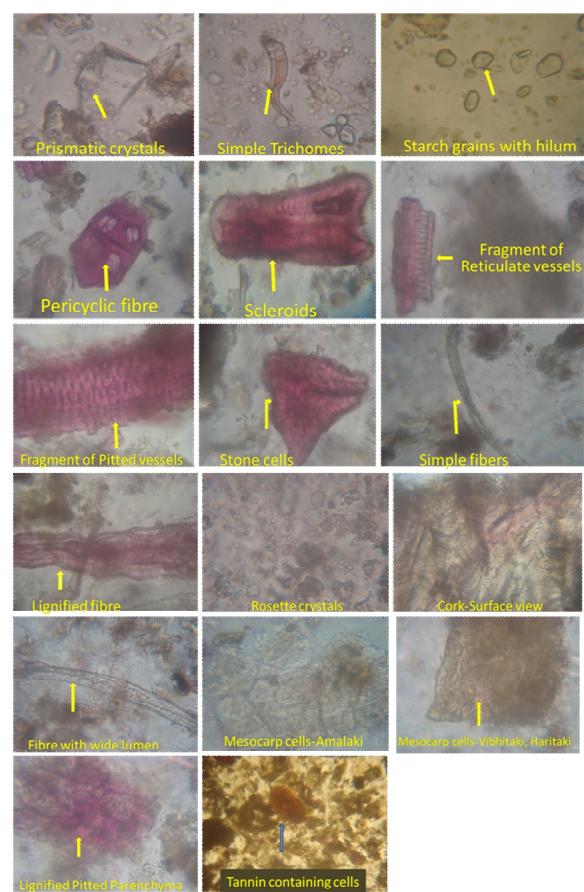


Figure - 1



Figure - 2

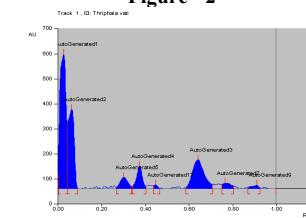


Figure – 3 Densitogram curve of methanol extract of TRIPHALAGUDUCHYADI VATI at 254nm and 366nm

