Pharmacognostical and Physicochemical Evaluation of *Stanya Shodhan Gana Churna*- An Ayurvedic Formulation in the Management of PCOS

Pandit D. Kale¹,²*, L. P. Dei², S. B. Donga³, Anup Thakar⁴, Harisha C. R.⁵ and Shukla V. J.⁶

¹,²,³Department of Streerog & Prasutitantra, I.P.G.T and R.A., GAU, Jamnagar, India.
⁴Department of Panchkarma, I.P.G.T and R.A., GAU, Jamnagar, India.
⁵Pharmacognosy Department, I.P.G.T and R.A., GAU, Jamnagar, India.

Abstract

PCOS is a syndrome of ovarian dysfunction along with the cardinal features of hyperandrogenism and polycystic ovarian morphology. *Stanya Shodhan Gana* is effective in *Stanya Vikruti* in Ayurvedic treatises. *Stanya* and *Artav* both are *Updhatu* of *Rasa Dhatu* hence *Stanya Shodhan Gana* can be act on *Artav dusti* also which is the by-product of same Origin. Keeping this hypothesis in mind, the *Stanya Shodhana Gana* may be effective in the management of PCOS. The present study was aimed at setting up a standard profile of *Stanya Shodhan Gana* which was prepared using pharmacognostical authenticated drugs like *Patha*, *Shunthi*, *Devdaru*, *Nagarmotha*, *Murva*, *Guduchi*, *Vatsak*, *Kirattikta*, *Kutaki* and *Sariva* followed by subjecting it to Physico-chemical analysis as per standard protocol. The observations were systematically recorded. Pharmacognostical findings like Pitted Vessels of *Patha*, Oil Globules of *Devdaru*, Rhombidal Crystal of *Murva* confirm the presence of *Patha*, *Devdaru* and *Murva* etc drugs contain in *Stanya Shodhan Gana*. *Stanya Shodhan Gana Churna* was prepared as per API. HPTLC was carried out after organizing appropriate solvent system in which maximum 14 spots were distinguished at 254 nm and 12 spots at 366 nm.

**Keywords** Artav dusti, PCOS, *Stanya Shodhan Gana*, Pharmacognosy, Physico-chemical analysis

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INTRODUCTION
Polycystic Ovarian Syndrome (PCOS) is common syndrome among women of reproductive age. PCOS is a syndrome of ovarian dysfunction along with the cardinal features of hyper androgenism and polycystic ovarian morphology. The common features found in PCOS are menstrual disorders (Amenorrhoea or Oligomenorrhoea); Hirsutism, Obesity, Anovulation and Infertility. Though aetiology is unknown stress; depression, food habits, lack of exercise leading to obesity are the contributing factors. In spite of the high prevalence of PCOS even among young adult females the pathophysiology is poorly understood. In Ayurvedic classics Acharya's have explained eight types of Artava Dushti resulting in Beeja Dusti which is same as anovulation in PCOS leading to infertility. Granthi bhuta artava dushti is said to be Krichrasadhya in prognosis. Sushruta has described Artavam Sonitam and both Artava & Stanya are Updhatu of Rasa Dhatu. In Charak Samhita Charkacharya mentioned Stanya Shodhan Gana under the heading of Mahakashay's. Therefore, Stanya Shodhan Gana may also be effective in management of Artav dushti.

During the past few decades there has been increasing acceptance of natural products and therapies in the world. Also increase in use of Ayurvedic remedies globally. So we have to assure that there is no quality decrement and adulterations in Ayurvedic remedies. Therefore, quality control for efficacy and safety of herbal products is of main concern. Main challenge is to maintain the quality of the formulation. The development of this traditional system of medicine with the perspective of safety, efficacy and quality will help not only to preserve the traditional heritage but also to rationalize the use of the natural products in healthcare. Initial steps in quality standardization of compound formulation are to establish the presence of each ingredient in the finished product, followed by the pharmaceutical analysis. In the present study, Stanya Shodhan Gana Churna compound was subjected to pharmacognostical (powder microscopy), HPTLC and pharmaceutical evaluation for various physicochemical parameters in order to prepare a preliminary profile of formulation for future.

MATERIAL AND METHODS
Collection of Raw Materials:
All the raw drug materials were collected from the pharmacy attached with Institute of Gujarat Ayurved University. The ingredients and parts of the drugs used are given in Table-1.

Table 1 Ingredients of Stanya Shodhan Gana Churna

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Drugs</th>
<th>Botanical Name</th>
<th>Part Used</th>
<th>Ratio</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patha</td>
<td>Cissampelos pareira Linn.</td>
<td>Whole plant</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>2</td>
<td>Sunthi</td>
<td>Zingiber officinale Roxb.</td>
<td>Dry Rhizome</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>3</td>
<td>Devdaru</td>
<td>Cedrus deodara Roxb. Loud.</td>
<td>Bark</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>4</td>
<td>Nagaremotha</td>
<td>Cyperus scariosus R.Br.</td>
<td>Dry Rhizome</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>5</td>
<td>Murva</td>
<td>Marsdenia tenacissima W. &amp; A.</td>
<td>Stem</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>6</td>
<td>Guduchi</td>
<td>Tinospora cordifolia Willd.</td>
<td>Stem</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>7</td>
<td>Vatsake (Kutaj)</td>
<td>Holarrhena antidysenterica Wall.</td>
<td>Bark</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>8</td>
<td>Kirattikta</td>
<td>Swertia chirata Roxb.</td>
<td>Whole plant</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>9</td>
<td>Kutaki</td>
<td>Picrorhiza kurroa Royle ex Benth.</td>
<td>Rhizome</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
<tr>
<td>10</td>
<td>Sariva</td>
<td>Hemidesmus indicus Linn. R. Br.</td>
<td>Root</td>
<td>1 Part</td>
<td>Churna</td>
</tr>
</tbody>
</table>

Pharmacognostical Study:

In Pharmacognosy laboratory of I.P.G.T. & R.A., Jamnagar; analysis of Stanya Shodhan Gana Churna was carried out. The identification was carried out based on organoleptic characters of Stanya Shodhan Gana Churna and later pharmacognostical evaluation of the Churna was carried out. The powder (Stanya Shodhan Gana Churna) was dissolved in small quantity of distilled water, filtered through filter paper, studied under the Carl-Zeiss Trinocular microscope attached with camera, with stain and without stain. The microphotographs were also taken under the microscope.

Preparation of Stanya Shodhan Gana Churna:

Drugs mentioned in Stanya Shodhan Gana i.e., Patha, Shunthi, Devdaru, Nagarmotha, Murva, Guduchi, Vatsak, Kirattikta, Kutaki and Sariva were taken and made it into fine powder. Then all the powders were mixed to attain a homogenous mixture. It was then packed in air tight covers.

Pharmaceutical Evaluation:

By using quantitative and qualitative parameters at pharmaceutical laboratory Stanya Shodhan Gana Churna was analysed. The common parameters mentioned for Churna in Ayurved Pharmacopeia of India and C.C.R.A.S guidelines are total Ash value, pH value, water soluble and methanol soluble extracts. So these parameters were selected for this study. Presence of high moisture content in a sample can create preservation problems in Churna. Hence loss on drying was also selected as one of the parameter.
High Performance Thin Layer Chromatography:
Methanolic extract of Stanya Shodhan Gana Churna compound was spotted on pre-coated silica gel GF CO254 Aluminium plate as 5 mm bands, 5 mm apart and 1 cm from the edge of the plates, by means of camage, linomate V sample applicator fitted with a 100 μL. Hamilton syringe was used as the mobile phase. After development, densitometry scanning was performed with a camage TLC scanner III reflectance absorbance mode at 254 nm and 366 nm under control of win CATS software (V 1.2.1 manufactured by CAMAGE Switzerland). The slit dimensions were 6.00 x 0.45 mm and the scanning speed was 20 mm per second.

OBSERVATIONS AND RESULTS
The initial purpose of the study was to confirm the authenticity of the drugs used in the preparation of Stanya Shodhan Gana Churna. For this powder of all the ingredients were subjected to organoleptic and microscopic evaluation separately to confirm the genuineness of all the raw drugs. Later after the preparation of formulation, pharmacognostical evaluation was carried out.

Organoleptic Evaluation:
Organoleptic features like colour, odour and taste of the Stanya Shodhan Gana Churna were recorded and placed in Table 2.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Dull Green</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>Characteristic</td>
</tr>
<tr>
<td>3</td>
<td>Test</td>
<td>Bitter</td>
</tr>
<tr>
<td>4</td>
<td>Consistency</td>
<td>Fine</td>
</tr>
</tbody>
</table>

Microscopic Evaluation:
Microscopic evaluation was conducted by dissolving powder of Stanya Shodhan Gana Churna in the distilled water and studied under microscope for the presence of characteristics of ingredient drugs. The diagnostic characters are pitted vessels of Patha (Image:01), compound starch grains of Patha (Image:02), prismatic crystal of Patha (Image:03), fragment of scalariform vessel of Shunthi (Image:04), simple starch grain of Shunthi (Image:05), oil globules of Devdaru (Image:06), cork cells with oil content of Devdaru (Image:07), stone cells with tanin content of Devdaru (Image:08), fibre of Devdaru (Image:09), fibres passing through medullary rays of Devdaru (Image:10), deposition of silica of Nagarmotha (Image:11), simple starch grain of Nagarmotha (Image:12), sclereids form

**Physico Chemical Parameters:**

Physico chemical parameters of the *Churna* like loss on drying, pH values were found within the normal range. Methanol and water soluble extractive values were found to be 7.49% and 8.44% respectively. Details are shown in Table 3.

**Table 3** Physico-chemical analysis of *Stanya Shodhan Gana Churna*

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Loss on drying at 110 °C</td>
<td>3.8 % w/w</td>
</tr>
<tr>
<td>2.</td>
<td>Ash Value</td>
<td>10.76 % w/w</td>
</tr>
<tr>
<td>3.</td>
<td>Water soluble extract</td>
<td>8.44 % w/w</td>
</tr>
<tr>
<td>4.</td>
<td>Methanol Soluble extract</td>
<td>7.49 % w/w</td>
</tr>
<tr>
<td>5.</td>
<td>pH (5% Aqueous solution)</td>
<td>6.5</td>
</tr>
</tbody>
</table>

**Table 4** Particle Size of *Stanya Shodhan Gana Churna*

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Size of Sieve of Mesh</th>
<th>% of Raw Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Above 60 #</td>
<td>16.73 %</td>
</tr>
<tr>
<td>2.</td>
<td>Between 60-85 #</td>
<td>57.95 %</td>
</tr>
<tr>
<td>3.</td>
<td>Between 85-120 #</td>
<td>19.28 %</td>
</tr>
<tr>
<td>4.</td>
<td>Below 120 #</td>
<td>06.04 %</td>
</tr>
</tbody>
</table>
3. Prismatic Crystal of *Patha*

4. Fragment of Scaleriform Vessel of *Shunthi*

5. Simple Strach Grain of *Shunthi*

6. Oil Globules of *Devdaru*

7. Cork Cells with Oil Content of *Devdaru*

8. Stone Cells with Tanin Content of *Devdaru*
9. Fiber of *Devdaru*

10. Fibers passing through Medullary Rays of *Devdaru*

11. Deposition of Silica of *Nagarmotha*

12. Simple Starch Grain of *Nagarmotha*

13. Sclereids Form Vessels of *Nagarmotha*

14. Sclereids of *Murva*
15. Prism of *Murva*

16. Rhombidal Crystal of *Murva*

17. Colenchyma Cells of *Guduchi*

18. Cork Cells in Surface View of *Guduchi*

19. Border Pitted Vessels of *Guduchi*

20. Fragment of Pitted Vessels of *Guduchi*
21. Cork with Dark Brown Content of Kutai

22. Stone Cells of Kutaj

23. Rhombidal Cells of Kutaj

24. Simple and Compound Starch Granules of Kutaj

25. Stone Cells of Kutaki

26. Pitted Vessels of Kutaki
High Performance Thin Layer Chromatography:

Densitometry scanning of the HPTLC pattern showed 14 spots at corresponding Rf values 0.00, 0.11, 0.16, 0.19, 0.22, 0.24, 0.35, 0.40, 0.44, 0.51, 0.62, 0.68, 0.78, 0.90 in short wave UV 254 nm and 12 spots at corresponding Rf values 0.00, 0.09, 0.16, 0.18, 0.22, 0.24, 0.31, 0.35, 0.42, 0.52, 0.70, 0.79 obtained in long wave UV 366 nm (Table No.5). Though it was not possible to identify particular chemical constituent from the spot obtained, the pattern may be used as a reference standard for further quality control researches. (Images: 34-36).

DISCUSSION

Powder microscopy of Stanya Shodhan Gana Churna revealed the diagnostic characters like pitted vessels, starch grains, prismatic crystal of Patha; fragment of scalariform vessel of Shunthi, cork cells with oil content of Devdaru, stone cells with tanin content of Devdaru; deposition of silica of Nagarmotha; sclereids form vessels of Nagarmotha, sclereids and prism of Murva; rhombidal crystal of Murva; colenchyma cells of Guduchi, cork cells in surface view of Guduchi; border pitted vessels of Guduchi; cork with dark brown content of Kutaj; stone cells of Kutaj; rhombidal cells of Kutaj, simple and compound starch granules of Kutaj; stone cells of Kutaki; pitted vessels of Kutaki; exaderm cells of Kutaki; lignified pitted sclerids of Kirattikta;ollen cells of Kirattikta; spiral vessels of Kirattikta; pitted sclereids of Kirattikta; prismatic crystal of Sariva; cork cells with tanin content of
Sariva which authenticate genuineness of the raw drugs of Stanya Shodhan Gana Churna.
Taste of Stanya Shodhan Gana Churna was Tikta (bitter) Rasa because Katuki, Patha, Devdaru, Nagarmotha, Murva, Guduchi, Kutaj and Kirattikta of Tikta Rasa are in maximum quantity in Stanya Shodhan Gana Churna having strong bitter taste results in bitterness of Churna. Odour of Stanya Shodhan Gana Churna is characteristic.
Moisture contents should be minimum to prevent degradation of product. Excess of water in formulation encourage microbial growth, presence of fungi or insects and deterioration following hydrolysis. Stanya Shodhan Gana Churna contains 3.8 % w/w moisture, showing that the Churna should be protected from humid atmosphere. Ash values are the criteria to judge the identity and purity of crude drugs were total ash, water soluble are considered. Stanya Shodhan Gana Churna contained 10.76 % w/w total ash. The results revealed that Stanya Shodhan Gana Churna is free from unwanted organic compounds and production site was good enough keeping sample free from dust and other solid matters. The 8.44 % w/w of water soluble extractives and 7.49 % w/w methanol soluble extractives were present in Stanya Shodhan Gana Churna indicating that the drug is having good solubility in water.
In HPTLC study 14 spots at 254 nm and 12 spots at 366 nm were obtained, indicating its possible components of matrix which may possess its therapeutic effect.

CONCLUSION
In today’s era most important is given to standardisation of drug for assurance of quality. Keeping this aim in mind current study was planned. The ingredients of Stanya Shodhan Gana Churna were identified and authenticated pharmacognostically. Pharmacognostical study reveal genuineness of drug; as all the characters of ingredients were observed microscopically. Physico-chemical and HPTLC studies inferred that the formulation meets the minimum quality standards as reported in the API at a preliminary level. Additional important analysis will be required for the identification of active chemical constituents of the test drug.
REFERENCES


