

**PHARMACEUTICO-ANALYTICAL STUDY OF PATOLADI CHURNA AND IT'S
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ABSTRACT

Introduction: Patoladi Churna is a classical Ayurvedic polyherbal formulation comprising Patola, Nimba, Manjishtha and Tulsi and is described in relation to Kikkisa. Although the powder dosage form is pharmaceutically simple, its topical application may be inconvenient. The present study therefore explored conversion of Patoladi Churna into a scrub formulation and evaluated its pharmaceutical, physicochemical, microbiological and chromatographic characteristics together with in vitro cell viability. **Objectives:** To prepare Patoladi Churna according to the classical procedure, develop a Patoladi Scrub, characterize both preparations using selected analytical parameters, and assess their in vitro cytocompatibility using the MTT assay on L929 mouse connective tissue cells. **Materials and Methods:** Authenticated raw materials of Patola, Nimba, Manjishtha and Tulsi were processed into Churna and subsequently incorporated into a topical scrub base. Organoleptic and physicochemical parameters, microbiological quality, heavy metals, preliminary phytochemical characteristics, HPTLC and HPLC-PDA profiles were evaluated. Cell viability was assessed in triplicate at 10, 40 and 100 µg/mL using the MTT assay. **Results:** The final Patoladi Churna yield was 869 g from 880 g of the four sieved ingredients. The Churna showed 8.38% loss on drying, 13.51% total ash, 2.93% acid-insoluble ash, 5.10% alcohol-soluble extractive, 9.21% water-soluble extractive and pH 6.50. The Patoladi Scrub showed pH 5.89, loss on drying 2.93% and spreadability 6.4 cm, with satisfactory homogeneity, washability, foamability and grittiness; no irritation or rancidity was observed, and no phase separation occurred after exposure at 45 ± 1°C for 48 h. Microbial counts were 38 CFU/g for total plate count and 4 CFU/g for yeast and mould. HPTLC demonstrated characteristic marker profiles, including confirmation of eugenol in Tulsi extract against the reference standard. HPLC-PDA showed three major chromatographic constituents; a predominant peak at 1.875 min with 52.50% area and UV maxima at 262 and 336 nm was putatively interpreted as a quercetin-like flavonoid. In the MTT assay, viability for Churna was 93.08%, 87.29% and 67.51% at 10, 40 and 100 µg/mL, respectively; corresponding values for Scrub were 87.97%, 84.62% and 67.51%. **Conclusion:** Patoladi Scrub was successfully developed from the classical Churna and demonstrated satisfactory pharmaceutical and analytical characteristics. The cell-line findings support preliminary cytocompatibility at the lower tested concentrations, while the reduction in viability at 100 µg/mL warrants cautious interpretation. Further analytical confirmation, dermal safety studies and well-designed clinical evaluation are required before conclusions regarding therapeutic efficacy or long-term topical safety can be made.

KEYWORDS: Ayurveda; Churna Kalpana; Patoladi Churna; Patoladi Scrub; Kikkisa; striae gravidarum; HPTLC; HPLC-PDA; L929; MTT assay.**INTRODUCTION**

Ayurvedic pharmaceuticals (Bhaishajya Kalpana) includes dosage-form-specific methods designed to transform raw medicinal substances into preparations suitable for

therapeutic use. Churna Kalpana represents a powder dosage form in which appropriately processed drugs are reduced to a suitable particle size and blended to obtain a homogeneous preparation. Patoladi Churna is a classical

polyherbal formulation comprising Patola, Nimba, Manjishtha and Tulsi and is described in the Sharira sthana of Ashtanga Hridaya in relation to Kikkisa.

Kikkisa has been discussed in the Ayurvedic literature in the context of characteristic skin changes and is commonly correlated with striae gravidarum in contemporary discussion. Topical application of a dry powder, however, can be inconvenient because of handling, adherence to the skin and difficulty in achieving uniform application. Modification of an established powder formulation into a semisolid scrub may improve handling and application characteristics while retaining the herbal drug component.

From a pharmaceutical-development perspective, modification of a classical formulation should be accompanied by systematic characterization of the finished product. Physicochemical parameters provide information on consistency and quality; microbiological testing supports quality assessment of a topical formulation; chromatographic profiling can provide a reproducible phytochemical fingerprint; and in vitro cell-based assays can provide preliminary information regarding cellular compatibility.

Accordingly, the present work was undertaken to prepare Patoladi Churna, develop a modified Patoladi Scrub and evaluate the resulting preparations through pharmaceutical, physicochemical, microbiological and

chromatographic assessment, together with an in vitro MTT assay using L929 mouse connective tissue cells.

AIMS AND OBJECTIVES

Aim

To prepare Patoladi churna and modify it into a scrub and carry out analytical study and cell line toxicity study of Patoladi churna and scrub.

OBJECTIVES

1. To prepare Patoladi churna as per SOP.
2. To carry out Pharmaceutico-analytical study of Patoladi Churna.
3. To develop pharmaceutico - analytical profile of scrub prepared from Patoladi churna.
4. To carry out cell line toxicity study of the Patoladi Churna and Scrub.

MATERIALS AND METHODS

The work comprised pharmaceutical preparation, analytical standardization and an in vitro cell viability experiment. The experimental procedures and numerical observations were taken from the corresponding postgraduate dissertation work.

Raw materials and authentication

Authenticated raw materials of Patola (Patola Patra): Nimba (Nimba Twaka): Manjishtha (Manjishtha Mula) and Tulsi (Tulsi Beeja) were used for preparation of Patoladi Churna. The raw drugs were cleaned, processed and powdered separately before sieving.

RAW MATERIALS



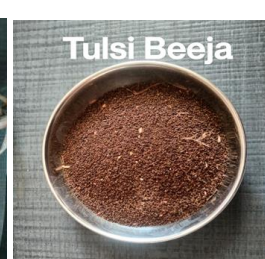
MANJISHTA MULA



PATOLA PATRA



NIMBA TWAK



TULASI BEEJA

Preparation of Patoladi Churna - Ingredients

SR.NO.	INGREDIANTS	QUANTITY
1.	PATOLA PATRA CHURNA	220GM
2.	NIMBA TWAK CHURNA	220GM
3.	MANJISTHA MULA CHURNA	220GM
4.	TULASI BEEJA CHURNA	220GM

The four ingredients were taken in equal quantities of 220 g each after sieving and were mixed thoroughly for 30 min to obtain a homogeneous powder.

The final product was stored in an airtight container. The preparation yielded 869 g of Churna from a total input of 880 g.

**TULASI BEEJA****MANJISTHA****PATOLA****NIMBA****MIXING OF ALL CHURNA****PATOLADI CHURNA****Development of Patoladi Scrub**

The prepared Patoladi Churna was incorporated into a topical scrub formulation using the excipients described in the dissertation. The formulation process involved

preparation of the oil phase, heating and blending, followed by incorporation of the Patoladi Churna and other formulation components. The finished formulation was subjected to organoleptic and quality evaluation.

**VIT-E CAPSULES****HYDROGENATED****ALMOND OIL****PRESERVATIVE CASTOR OIL****LAVENDER ESSENCE****PATOLADI CHURNA****SHEA BUTTER****EMULSIFYING WAX**

PROCESS OF SCRUB MAKING

1. Preparation of Oil Phase - ingredients

SR. NO.	INGREDIENTS	QAUNTITY
1	ALMOND OIL	140ML
2	SHEA BUTTER	100GM
3	EMUSIFYING WAX	100GM
4	HYDROGENATED CASTOR OIL	20ML

Procedure – these four ingredients were placed in a clean glass beaker. Shea butter and emulsifying wax were in solid form. Almond oil and hydrogenated castor oil was in liquid form.

Heating Process -The glass beaker was placed in a hot water, indirect heating was provided and Heating was continued till all ingredients melted completely. gradual melting of Shea butter and emulsifying wax started .After heating, shea butter, emulsifying wax and almond oil formed a single uniform liquid with no burning or charring observed. afterwards The beaker was removed from water bath. The melted mixture was kept at room temperature for cooling.

Blending -The cooled mixture was taken for blending with blender for 10 minutes and continued till uniform consistency was obtained. Consistency of mixture was semi solid and creamy like faint almond and the colour was milky white with smooth and homogeneous texture and appearance.

2. Addition of Active Ingredients

SR. NO.	INGREDIENTS	QUANTITY
1.	PATOLADI CHURNA	80GM
2.	VITAMIN E	6 CAPSULES
3.	POTTASIMUM SORBATE	2 DROPS
4.	JASMINE ESSENCE	3 DROPS

Patoladi Churna (80 gm) was added slowly with continuous mixing. Vitamin E (6 capsules): potassium sorbate (Q.S) and fragrance (as required) again the mixture was blended for upto 10 min till homogeneous consistency was achieve. After complete blending the colour changed due to addition of herbal powders. mild granular texture appeared with aromatic jasmine fragrance with no lump formation. Stable formulation achieved with smooth texture, semisolid consistency with fine granules and brown colour. the prepared scrub (420 gm) was transferred into airtight container and stored in cool and dry place.



MELTING OF SHEA BUTTER



MELTING OF EMJUSIFYING WAX



PATOLADI SCRUB



Physicochemical evaluation

The Churna and individual ingredients were assessed for selected physicochemical parameters including loss on drying, total ash, acid-insoluble ash, alcohol-soluble

extractive, water-soluble extractive and pH. Particle size and other observations were recorded as described in the dissertation. The scrub was evaluated for pH, loss on drying, spreadability, homogeneity, washability,

foamability, grittiness, irritation and rancidity, together with short-term thermal stability.

Microbiological and heavy-metal evaluation

Microbiological quality of the prepared formulation was assessed by total plate count and yeast and mould count. Heavy-metal analysis of the individual herbal ingredients was performed by atomic absorption spectrophotometry (AAS) for the reported elements.

Preliminary phytochemical and chromatographic evaluation

Preliminary phytochemical screening was performed for selected classes of constituents. HPTLC profiling was undertaken for marker-related assessment of the constituent drugs, including gallic acid in Patola, alizarin in Manjishtha, eugenol in Tulsi and quercetin-related profiling in Nimba. For the reported HPTLC development, silica gel 60 F254 plates and the documented mobile phase Ethanol: Formic Acid: Toluene: Ethyl Acetate (2: 2: 3.5: 8, v/v/v/v) were used, with chamber saturation for 20 min.

HPLC-PDA analysis was also performed. A predominant chromatographic peak was observed at a retention time of 1.875 min, representing 52.50% of the reported peak area, with UV maxima at 262 and 336 nm. This peak was interpreted in the dissertation as a quercetin-like flavonoid; the assignment is considered putative unless confirmed by an authentic standard or LC-MS/MS.

MTT Cell Viability Assay

In vitro cytocompatibility was assessed using L929 mouse connective tissue cells. Cells were maintained in DMEM supplemented with 10% fetal bovine serum under standard culture conditions of 37°C and 5% CO₂. Test samples were evaluated at 10, 40 and 100 µg/mL. The assay was performed in triplicate. Following the MTT reaction and dissolution of formed formazan with DMSO, absorbance was measured at 570 nm using a BioLine BD 206 ELISA microplate reader. Cell viability was calculated relative to the untreated control.

RESULTS

Physicochemical characteristics

Sample	LOD (%)	Total ash (%)	Acid-insoluble ash (%)	Alcohol extractive (%)	Water extractive (%)
Patola	2.78	6.22	2.04	11.37	22.66
Nimba	11.03	6.32	0.17	4.04	3.70
Manjishtha	7.60	5.79	0.50	3.81	10.77
Tulsi	4.90	16.61	10.64	1.21	5.34
Patoladi Churna	8.38	13.51	2.93	5.10	9.21

The pH values of Patola, Nimba, Manjishtha, Tulsi and Patoladi Churna were 10.31, 6.32, 4.97, 4.64 and 6.50,

respectively. The particle size reported for Patoladi Churna was 180 µm.

Heavy-metal and phytochemical findings

Element (ppm)	Patola	Nimba	Manjishtha	Tulsi
Pb	0.137	2.647	0.117	0.602
Cd	0.058	0.030	0.054	0.023
As	0.653	0.216	0.131	0.508
Hg	0.016	0.023	0.089	0.046
Ni	1.687	0.999	1.205	1.276
Cr	0.492	1.321	0.961	1.525
Cu	3.836	5.482	3.249	2.522
Zn	17.796	13.319	15.052	21.241
Fe	36.133	27.256	59.770	24.515

Preliminary phytochemical screening reported tannins, flavonoids and glycosides in all four ingredients, while alkaloids were reported in Nimba and Manjishtha.

Quality characteristics of Patoladi Scrub

Parameter	Observation
Ph	5.89
Loss on drying	2.93%
Spreadability	6.4 cm
Homogeneity	Uniform
Washability	Passed

Foamability	Passed
Grittiness	Passed / acceptable
Irritation	Absent
Rancidity	Absent
Thermal stability	No phase separation at 45 ± 1°C for 48 h
Total plate count	38 CFU/g
Yeast and mould count	4 CFU/g

Chromatographic findings

HPTLC profiling was performed for the selected marker constituents. The dissertation reports confirmation of eugenol in the Tulsi extract through comparison with the reference standard based on matching chromatographic migration and visualization characteristics. The HPTLC work also included marker-related analysis of Patola, Manjishtha and Nimba.

HPLC-PDA profiling revealed three major constituents in the analyzed extract. The predominant peak occurred at 1.875 min and accounted for 52.50% of the reported peak area. Its UV maxima were 262 and 336 nm. The dissertation interpreted this spectral pattern as suggestive of a quercetin-like flavonoid. Because the available study did not establish definitive identity by LC-MS/MS or documented co-injection with an authentic standard, the assignment should be regarded as putative.

In vitro cell viability

Sample	Concentration	Mean OD	Cell viability (%)	Interpretation
Control	—	2.110	100.00	Reference
Patoladi Churna	10 µg/mL	1.964	93.08	High viability
Patoladi Churna	40 µg/mL	1.842	87.29	High viability
Patoladi Churna	100 µg/mL	1.424	67.51	Reduced viability
Patoladi Scrub	10 µg/mL	1.856	87.97	High viability
Patoladi Scrub	40 µg/mL	1.785	84.62	High viability
Patoladi Scrub	100 µg/mL	1.424	67.51	Reduced viability

DISCUSSION

The pharmaceutical procedure produced a homogeneous Patoladi Churna with an overall final yield of 869 g from 880 g of the sieved component quantities. The reported organoleptic characteristics—brownish-green colour, herbaceous odour, bitter taste and smooth texture—were consistent with the herbal nature of the formulation. The physicochemical profile provides a baseline for quality control of the prepared Churna.

The Churna exhibited 8.38% loss on drying and a pH of 6.50. The extractive values demonstrate the presence of both water- and alcohol-soluble fractions, while ash-related parameters provide additional quality-control measures. Importantly, these values represent the tested batch and should not be interpreted as universal specifications without validation using multiple independent batches.

Conversion into a scrub produced a formulation with pH 5.89 and spreadability of 6.4 cm. The formulation was reported as homogeneous and passed the evaluated washability, foamability, grittiness and irritation observations. The absence of phase separation after 48 h at 45 ± 1°C supports short-term physical stability under the tested condition; it should not be equated with a full shelf-life or long-term stability study.

Microbiological findings of 38 CFU/g total plate count and 4 CFU/g yeast and mould count indicate low microbial burden in the tested batch. Heavy-metal results

for the individual herbal ingredients were also recorded, providing useful raw-material quality information. These observations strengthen the analytical documentation of the formulation, although formal product specifications should be established from validated methods and multiple batches.

Chromatographic evaluation adds a chemical-fingerprint dimension to the study. The reported eugenol comparison in Tulsi provides a marker-based confirmation of one constituent. The HPLC-PDA profile, including the major peak at 1.875 min with UV maxima at 262 and 336 nm, suggests the presence of a flavonoid with quercetin-like spectral characteristics. However, chromatographic retention time and UV spectrum alone are insufficient for unequivocal structural identification; confirmatory LC-MS/MS or authentic-standard co-injection would strengthen the analytical conclusion.

The L929 MTT assay demonstrated a concentration-dependent reduction in viability for both preparations. At 10 and 40 µg/mL, viability remained high for both Churna and Scrub. At 100 µg/mL, viability decreased to 67.51% for each preparation. Thus, the findings support preliminary cellular compatibility at the lower tested concentrations but indicate reduced metabolic activity at the highest concentration. The identical mean absorbance and viability reported for both samples at 100 µg/mL should be retained as recorded but independently checked against the original laboratory worksheet before journal submission.

Taken together, the study establishes a useful pharmaceutico-analytical profile for Patoladi Churna and its modified scrub and provides preliminary cell-based safety information. It does not, by itself, establish clinical efficacy in Kikkisa or striae gravidarum. Such conclusions require appropriately designed clinical studies with predefined outcomes and statistical analysis.

CONCLUSION

Patoladi Churna is a classical Ayurvedic formulation mentioned in the Ashtanga Hridaya Samhita for management of Kikkisa. It comprises herbs such as Patola, Nimba, Manjishta and Tulsi, which are known for their beneficial effects on skin health. In the present study, the classical Patoladi Churna was modified into a scrub formulation to improve ease of application while retaining its therapeutic potential for the management of Kikkisa.

Patoladi Churna was successfully prepared using equal quantities of Patola, Nimba, Manjishtha and Tulsi and subsequently developed into a topical scrub. The resulting formulation showed satisfactory pharmaceutical characteristics, including pH 5.89, 2.93% loss on drying, 6.4 cm spreadability, uniform homogeneity and acceptable evaluated quality attributes. Microbiological assessment showed low microbial counts in the tested batch, while chromatographic investigations provided characteristic phytochemical profiles. The L929 MTT assay indicated high cell viability at 10 and 40 µg/mL, with reduced viability at 100 µg/mL. The findings support further investigation of Patoladi Scrub as a topical formulation, but additional analytical confirmation, dermal safety studies, stability studies and well-designed clinical trials are necessary before therapeutic efficacy and long-term safety can be established. The present study was undertaken to explore the modification of Patoladi Churna, a classical Ayurvedic formulation described in Ashtanga Hridaya, into a more convenient scrub form for the management of Kikkisa, a common cosmetic concern during pregnancy. Considering the limitations of churna such as short shelf life and inconvenience in application, this modification was conceptualized to improve usability and patient compliance.

Overall the satisfactory pharmaceutical characteristics, analytical parameters, and safety profile of the developed Patoladi Scrub indicate that it is a standardized, safe, economical and promising herbal topical formulation with potential applicability in the management of Kikkisa, warranting further pharmacological and clinical validation.

Scope for Further Study

Formulation Development: stability studies, and large-scale standardization Further improvement of Patoladi Scrub.

Advanced Analytical Studies: Application of LC-MS/MS, GC-MS, and FTIR for detailed phytochemical profiling.

In Vitro Studies: Evaluation of collagen synthesis, wound healing, antioxidant, anti-inflammatory and skin regeneration activities.

In Vivo Studies: Assessment of dermal safety, pharmacological efficacy and long-term toxicity in suitable animal models.

Clinical Studies: Well-designed randomized controlled trials to establish the safety, efficacy and long-term therapeutic benefits of Patoladi Scrub in Kikkisa.

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