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Research Article

PHARMACOGNOSTIC AND PHYTOCHEMICAL EVALUATION OF *PANCHAKOLA CHOORNAM* FOR DIGESTIVE HEALTH: A CLASSICAL AYURVEDIC PERSPECTIVE

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ABSTRACT

Panchakola Choornam is a classical Ayurvedic formulation known for its *Deepana* and *Pachana* properties, traditionally used to correct digestive dysfunction and eliminate metabolic waste. This study aimed to validate and standardize the formulation through organoleptic, physicochemical, phytochemical, and TLC analyses. The *Choornam* exhibited characteristic sensory features and a mildly acidic pH (5.95), supporting its digestive role. Phytochemical screening confirmed the presence of glycosides, phenols, alkaloids, flavonoids, and coumarins, with water extracts highlighting hydrophilic constituents. TLC fingerprinting showed strong correlation with individual ingredients, ensuring formulation integrity, and revealed unique markers suggesting synergistic interactions. These findings affirm the safety, efficacy, and traditional use of *Panchakola Choornam,* providing a scientific basis for its standardization and future integration into evidence-based Ayurvedic practice.

INTRODUCTION

Ayurvedic medicine, rooted in ancient Indian wisdom, emphasizes holistic healing through natural remedies derived from herbs and minerals. Among its various dosage forms, *Choornam* (herbal powders) is widely used for its ease of administration and quick action. According to modern aspects *Choornam* is a solid dosage form of medicine that can be administered both internally and externally. They exist in both crystalline and amorphous forms. Powders are commonly used either directly or along with adjuncts. *Panchakola Choornam* is one such traditional formulation, valued for its potent *Deepana* (enhancing metabolic fire) and *Pachana* (enhancing digestion) properties.[1] In Ayurveda, the maintenance of health and the treatment of diseases are fundamentally dependent on the balanced functioning of *Agni*. A large proportion of ailments arise due to *Agni vaishamya* (disturbance in *Agni*), which leads to the accumulation of *Ama* (undigested metabolic waste). Vital aspects such as Ayu (life; lifespan), *Varna* (colour), *Bala* (strength), *Swasthya* (well-being), *Utsaha* (enthusiasm), *Prabha* (radiance), *Ojas* (vitality), *Tejas* (inner glow), and *Prana* (life force) are all rooted in the balanced state of *Agni*[2]. When *Agni* is functioning optimally, it ensures good health, whereas its imbalance results in disease.

Disruption in *Agni* disturbs the body's metabolic balance, adversely affecting both catabolic and anabolic processes. This leads to improper transformation of bodily tissues, weakened immunity, accumulation of metabolic wastes, and ultimately, the formation of free radicals. These free radicals cause tissue damage and can trigger premature metabolic disorders. In such situations, treatment focuses on eliminating blockages caused by *Ama* and correcting the *Mandagni* (weak state of *Agni*).

This therapeutic approach involves the use of *Deepana* and *Pachana*. *Deepana* herbs work by revitalizing *Agni* and enhancing appetite, while *Pachana* herbs facilitate the digestion and elimination of *Ama*.

The *Panchakola* herbs such as *Pippali, Pippalimula, Chavya, Chitraka, Nagara* are predominantly composed of substances with *Agni Mahabhuta* dominance, characterized by *Katu Rasa* (pungent taste), *Katu Vipaka* (pungent post-digestive effect), and *Ushna Virya* (hot potency), making it an excellent *Deepana-Pachana* medicine[3]. This study seeks to validate and standardize *Panchakola Choornam* for ongoing use and future therapeutic applications thorough scientific evaluation, including

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physicochemical testing, phytochemical analysis, and chromatographic methods.

The equivalent English words for Sanskrit words are selected from the Namaste Portal.[4]

MATERIALS AND METHODS

Collection of Raw materials

The raw materials were sourced from the raw material store of Sitaram Ayurveda Pvt. Ltd., Thrissur, and were subsequently identified and authenticated by the Pharmacognosy Division. All specimen samples were then preserved in the Quality Control Division of Sitaram Ayurveda Pvt. Ltd. The ingredients used in the preparation of the *Choornam*, along with the specific plant parts utilized, are outlined in Table No. 1 and the pictures of the raw material added in the fig no 1 for the identification purpose.

Preparation of *Choornam*

Panchakola Choornam was prepared according to the ratio specified in Table-1 as per the classical text *Ashtamga hrudayam* at the production division of Sitaram Ayurveda Pvt. Ltd.

Table 1: List of raw materials of *Panchakola Choornam*

S.no	Sanskrit Name	Botanical Name	Part	Form	Ratio
1	*Pippali*	*Piper longum*	Fruit	Powder	1 part
2	*Pippalimula*	*Piper longum*	Root	Powder	1 part
3	*Chavya*	*Piper mullesua*	Stem	Powder	1 part
4	*Chitraka*	*Plumbago zeylanica*	Root	Powder	1 part
5	*Nagara*	*Zingiber officinale*	Rhizome	Powder	1 part

Figure 1: ***A: Pippali, B: Pippalimula, C: Chavya, D: Chitraka, E: Nagara, F: Panchakola Choornam***

Physicochemical Analysis of Raw Materials

A physicochemical analysis of the raw materials was carried out, which included tests such as total ash, acid-insoluble ash, water-soluble extractive, and alcohol-soluble extractive values. These evaluations were performed following the standard methodologies prescribed in the Ayurvedic Pharmacopoeia of India.[5]

Organoleptic and Physicochemical Assessment of *Choornam*

The organoleptic properties offer a general indication of the authenticity of the *Choornam*. Ayurvedic parameters such as colour, odour, and taste, along with key physicochemical attributes including pH, specific gravity, and total soluble solids, were examined[5].

Preliminary Phytochemical Analysis: The *Panchakola Choornam was* evaluated for the presence or absence of various preliminary phytochemical constituents, including carbohydrates, sugars, reducing sugars, ketoses, amino acids, proteins, starch, quinones, glycosides, flavonoids, phenols, saponins, alkaloids, tannins, and coumarins.[6]

Thin Layer Chromatography (TLC) Fingerprint Analysis

Thin Layer Chromatographic (TLC) finger printing was performed to separate and identify the

active constituents present in *Panchakola Choornam.* For this, 1 gram of *Choornam* was refluxed with 40ml of methanol for one hour, then filtered and evaporated. Filter the solution and applied onto silica gel-coated glass plates. Similarly, extracts of each individual raw ingredient were prepared using the same method. The TLC plate was developed using a mobile phase of toluene and ethyl acetate in a 9:1 ratio, and the chemical profiles were visualized and compared under UV light at wavelengths of 254nm and 366nm.[6]

RESULTS AND DISCUSSION

Organoleptic and Physicochemical Assessment

Organoleptic and physicochemical evaluations are essential for identifying and assessing the quality of a product, relying on sensory observation and basic laboratory techniques. The organoleptic characteristics of the freshly prepared *Panchakola Choornam* were examined, and the findings are presented in Table No. 2.

Table 2: Organoleptic and physicochemical parameters of *Panchakola Choornam*

No	Parameters	Results
1	Colour	Yellowish brown
2	Odour	Aromatic
3	Taste	Acrid pungent
4	pH	5.95
5	LOD	6.91
6	Total Ash	8.7%
7	Acid insoluble ash	1.71%
8	Water soluble extractive value	24.68%
9	Alcohol soluble extractive value	9.74%

The organoleptic and physicochemical evaluation of *Panchakola Choornam* confirms its quality and traditional utility as a digestive and carminative agent. The formulation exhibits a characteristic yellowish-brown colour, aromatic odour, and acrid-pungent taste, indicative of its bioactive ingredients. A pH of 5.95 suggests mild acidity, supporting gastrointestinal activity. The LOD value of 6.91% reflects acceptable moisture content, ensuring stability. Total ash and acid-insoluble ash indicate permissible levels of inorganic and siliceous matter. Water-soluble extractive value 24.68% and alcohol-soluble value 9.74% suggest a rich presence of both hydrophilic and polar constituents. These findings affirm the formulation's safety, efficacy, and purity of *Panchakola Choornam*.

Preliminary Phytochemical Analysis

Preliminary phytochemical analysis plays a vital role in assessing the therapeutic potential of a drug. The phytochemical components identified in *Panchakola Choornam* through both water and alcohol extracts are detailed in the table no 3.

Table 3: Phytochemical analysis of *Panchakola Choornam*

S.No	Organic Phytochemical constituents	Name of the test conducted	Present/Absent	
			Alcohol	Water
1.	Carbohydrate	Molisch's test	-	+
2.	Sugar	Benedict's test	+	+
3.	Ketose	Seliwanoff's test	-	+
4.	Protein	Biuret test	-	-
5.	Starch	K I test	-	+
6.	Glycoside	Keller killiani test	+	+
7.	Steroid	Salkowski test	+	-
8.	Terpenoid	Salkowski test	-	-
9.	Flavonoid	Alkaline reagent	+	-
10.	Phenol	Phenol reagent test	+	+
11.	Saponin	Foam test	-	-
12.	Alkaloid	Wagner reagent	-	+

13.	Tannin	Ferric chloride test	-	-
14.	Coumarin	NaOH test	+	-

'+': Presence, '–': Absence

The phytochemical analysis of *Panchakola Choornam* revealed notable differences in the solubility and extractability of various organic constituents in water and alcohol, highlighting the importance of solvent selection in herbal formulation and extraction processes.

Water extract showed a broader range of phytochemical constituents compared to the alcoholic extract. Key components such as carbohydrates (Molisch's test), reducing sugars (Benedict's test), ketoses (Seliwanoff's test), starch (KI test), glycosides (Keller-Killiani test), phenols (phenol reagent test), and alkaloids (Wagner's reagent) were found to be present in the aqueous extract. This suggests that hydrophilic phytochemicals dominate in *Panchakola Choornam.*

On the other hand, the alcoholic extract exhibited the presence of fewer phytochemicals, including reducing sugars, glycosides, steroids (Salkowski test), flavonoids (alkaline reagent test), phenols, and coumarins. Notably, steroids and flavonoids were detected only in the alcoholic extract, indicating their lipophilic nature and preference for alcohol as a solvent. Proteins, saponins, tannins, and terpenoids were absent in both extracts, suggesting either their non-existence in the formulation or presence in concentrations below detectable limits. The absence of saponins and tannins, typically associated with astringency and foaming, may support the milder nature of *Panchakola Choornam* on mucous membranes and its suitability for long-term use in traditional medicine. The presence of glycosides and phenols in both extracts supports potential antioxidant and cardioprotective effects, while the detection of alkaloids and flavonoids (in respective solvents) further emphasizes the diverse pharmacological potential of the formulation.[7]

Overall, the study underscores the complementary nature of aqueous and alcoholic extractions in capturing the full phytochemical profile of *Panchakola Choornam*. These findings may guide its therapeutic applications and inform standardization protocols for herbal formulations.

Thin Layer Chromatography (TLC) Fingerprint Analysis

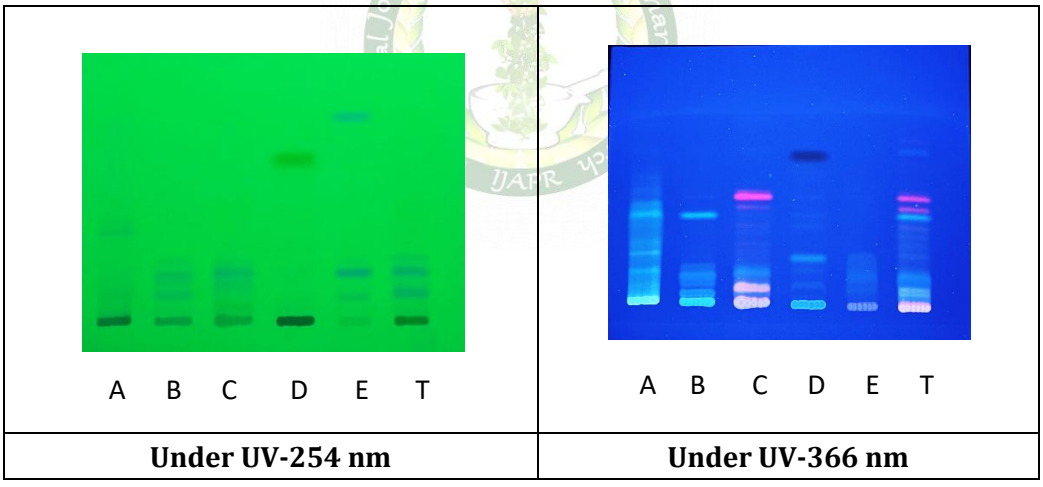

Figure 2: ***A: Nagara, B: Chavya, C: Pippalimula, D: Chitraka, E: Pippali, T: Panchakola Choornam***

Table 4: Rf values of *Panchakola Choornam* and its ingredients

No	Samples	Rf Values	
		254 nm	366 nm
1	A	0.10, 0.35	0.11, 0.22, 0.25, 0.36, 0.4, 0.45, 0.51
2	B	0.10, 0.18, 0.23	0.04, 0.11, 0.17, 0.36, 0.44
3	C	0.07, 0.15, 0.23, 0.45	0.07, 0.15, 0.24, 0.28, 0.35, 0.4, 0.43
4	D	0.04, 0.62	0.05, 0.15, 0.18, 0.38, 0.41, 0.42, 0.62
5	E	0.07, 0.17, 0.21, 0.78	0.10, 0.17, 0.22, 0.4
6	T	0.10, 0.15, 0.18, 0.23	0.04, 0.11, 0.32, 0.35, 0.4, 0.43, 0.62, 0.65

TLC profiling was carried out to evaluate the phytochemical fingerprint of *Panchakola Choornam* (T) and its five individual ingredients: *Chukku* (A), *Kattumulaku* (B), *Kattuthippali* (C), *Koduveli* (D), and

Thippali (E) which are detailed in Fig no 2 and table no 4. The Retention factor (Rf) values recorded under UV light at 254nm and 366nm indicate the presence of a diverse range of phytochemical compounds across all samples.

Under 254nm UV light, *Panchakola Choornam* (T) exhibited four distinct spots at Rf values of 0.10, 0.15, 0.18, and 0.23, several of which overlapped with those of individual ingredients. For example, Rf 0.10 was shared with A and B, Rf 0.15 with C and D, and Rf 0.23 with B and C. This suggests a clear correlation between the compound profile of the formulation and its constituents, indicating minimal chemical changes during formulation and good retention of phytochemical markers.

Under 366 nm UV light, the formulation (T) displayed eight spots at Rf 0.04, 0.11, 0.32, 0.35, 0.40, 0.43, 0.62, and 0.65, highlighting an even broader range of compounds visible under long-wave UV. Rf 0.11, 0.35, and 0.40 were common with multiple ingredients, particularly A (0.36, 0.4, 0.45, 0.51), B (0.11, 0.36, 0.44), and C (0.35, 0.4, 0.43). Notably, Rf 0.62, seen in both D and T, may serve as a potential marker for *Koduveli*-related constituents in the *Choornam*.

The overlapping Rf values between the *Panchakola choornam* and its ingredients under both wavelengths suggest a successful integration of key phytoconstituents from all ingredients into the final formulation. However, the presence of unique Rf values in the *Choornam* (e.g., 0.32, 0.65 at 366nm) may indicate new compound interactions or transformations occurring during the formulation process, possibly due to synergistic effects. TLC fingerprinting thus affirms the multi-herbal nature of *Panchakola Choornam* and validates the contribution of each individual component. It also provides a reliable method for quality control and standardization by offering reproducible markers for identification.

CONCLUSION

The comprehensive evaluation of *Panchakola Choornam* confirms its authenticity, safety, and therapeutic potential as a classical Ayurvedic digestive and carminative agent. Organoleptic and physicochemical parameters affirm its quality, while phytochemical analysis highlights the presence of both hydrophilic and lipophilic bioactive compounds, reflecting its broad pharmacological profile. TLC fingerprinting reveals strong correlation with individual ingredients and offers reproducible markers for standardization. This study bridges traditional Ayurvedic knowledge with modern scientific validation, reinforcing the need for quality assurance in classical formulations. It sets a valuable precedent for future research, standardization, and global acceptance of Ayurvedic medicines, supporting their integration into evidence-based healthcare without compromising traditional principles.

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