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ORIGINAL RESEARCH ARTICLE

A Preliminary Pharmacognostical and Phyto-Chemical Evaluation of *Pandughni Vati*: An Effective Formulation for Iron Deficiency Anemia

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ABSTRACT

Iron deficiency anemia affects millions of people worldwide. Children and women of reproductive age are at increased risk. Iron deficiency is harmful at all ages. In young children it impairs physical growth, cognitive development and immunity; at school age it affects school performance; at adulthood it causes fatigue and reduced work capacity; and among pregnant women, anemia may cause fetal growth retardation or low birth weight, and is responsible for a large proportion of maternal death. *Pandughni Vati* is an Ayurvedic herbal formulation which is indicated in the management of Pandu (Anaemia). Pharmacognostical study consists of both macroscopic and microscopy of raw drug exposed the quality and genuineness of all the constituents of *Pandughni Vati*, Organoleptic features of coarse powder made out of the crude drugs were within the standard range as per mention in classic.

Key words: *Pandu,* Anaemia, *Pandughni Vati*, Pharmacognosy, Physio-chemical Analysis

INTRODUCTION

Iron deficiency anemia is a global public health problem, as compelling and harmful as the epidemics of infectious diseases. With a global population of 6,700 million, at least 3,600 million people have iron deficiency and 2000 million out of these suffer from iron deficiency anemia. Children and women in reproductive age group are more vulnerable [1]. India continues to be one of the countries with the highest prevalence of anemia. National Family Health Survey NFHS 3 estimates reveal the prevalence of anemia to be 70-80% in children. Indian Government started a National Anemia Prophylaxis Programme in 1970. Subsequently the programme was modified and renamed the National Anemia Control Program (NACP) in 1991 for Control and Prevention of anemia in women of reproductive age and pre-school children. These programmes have been operational for over 40 years, but have made a little dent on the overall prevalence of anemia. Several other programmes focusing on issue of anemia include: ICDS, Mid-day meal programme, *Kishori Swasthya Yojna*, *Matri Suraksha Abhiyan*, IMA Anemia free India, as a Public Private Partnership and Anemia Chale Jao etc. However, most of these programmes have not had anticipated success and anemia prevalence goes on increasing.

Nutritional deficiency is considered to be the main etiological factor in Iron deficiency anemia though the other factors like malabsorption, worm infestations, chronic diseases and hemorrhage are also mentioned. Pallor is the major symptom described in iron deficiency anemia. According to the Ayurvedic classics the nearest correlation of iron deficiency anemia can be made with *Pandu Roga*, because predominance of *Panduta* or pallor in the whole body is termed as *Pandu Roga*. *Pandu* includes various types of anemia among which IDA is one.

Clinical features of *Pandu* develop from the depletion of *Rasa Dhatu* which in turn becomes ineffective in the production of *Rakta Dhatu*. The decreased level of circulating *Rasa* and *Rakta* which have the prime functions of nourishment and providing support to the vital functions gives rise to the symptoms like depletion of blood and flesh, fatigue, body ache, palpitation, periorbital

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edema, anorexia, dyspepsia, fever, dyspnoea and fainting [2].

There are various herbal and herbomineral formulations mentioned in Ayurveda classics for the management of *Pandu*. *Pandughni vati* is one compound herbal formulation which is very safe to be used in children. The trial compound contains *Deepana*, *Pachana*, *Raktavardhaka* and *Ushana Virya* drugs. All are easily available. Most of them are *Kaphavatashamaka*. *Pandughni Vati* is one of the most potential Herbal compound preparations which are claimed by various researches to be extremely successful in the management of *Pandu*. But till now no Pharmacognostical, pharmacological or phytochemical evaluation of this compound is been conducted.

Thus an attempt was made to evaluate its physico - chemical profile. Pharmacognostically authenticated ***Pandughni Vati*** was analyzed through qualitative and quantitative analysis of Physico-chemical parameters. Fingerprints of Thin Layer Chromatography (TLC) and High-Performance Thin Layer chromatography study (HPTLC) were also developed.

AIMS AND OBJECTIVES

Pharmacognostical study and Phyto-chemical analysis of *Pandughni Vati*

MATERIALS & METHODS

Procurement of raw material:

All herbal part of formulation was procured from the pharmacy, Gujarat Ayurved University, Jamnagar. *Gomutra* was collected from local areas of Jamnagar. The ingredients and the part used are given in (**Table 1 & 2**).

Pharmacognostical Evaluation:

Raw drugs were identified and authenticated by the Pharmacognosy department, I.P.G.T & R.A., Gujarat Ayurved 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 Corl zeiss microscope attached with camera, with stain and without stain. The microphotographs were also taken under the microscope.

Methods of Preparation of the *Pandughni Vati*:

Ingredients 1 to 8 (**Table 1**) were cleaned, dried, powdered and passed through sieve number 85. *Bhavana was* given with *Bhawana dravya* 1 to 4 as mentioned in (**Table 2**). For the purpose of the binding 5%, gum acacia was mixed. Then the mixture was converted in to granules with the help of the granular machine and finally punched into tablets (500 mg) by tablet making machine.

PHARMACEUTICAL EVALUATION

Physicochemical parameters:

Pandughni Vati was analyzed by using standard qualitative and quantitative parameters at the pharmaceutical chemistry Laboratory of I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar. The common parameters mentioned for compressed tablets in Ayurvedic pharmacopoeia of India[3] and CCRAS guidelines[4] were considered for pharmaceutical evaluation. Presence of more moisture content in a sample may create preservation problem. Hence loss on drying was also selected as one of the parameters.

High-Performance Thin Layer Chromatography study:

Methanol extract of *Pandughni Vati* was spotted on pre coated silica gel GF 60 aluminium plate as 5 mm bands, 5 mm apart and 1 cm from the edge of the plates, by means of a Camang Linomate V sample applicator fitted with a 100 µL Hamilton syringe. Toluene (7ml), Ethyl acetate (2ml), Acetic acid (1ml) was used as the mobile phase. After development, Densitometric scanning was performed with a Camag TLC scanner III in reflectance absorbance mode at 254 nm and 266 nm under control of win CATS software (v1.2.1 camag). The slit dimentions were 6 mm x 0.45 mm and the scanning speed was 20mm per second. All HPTLC plates were scanned with filter faction Savitsky-goloy 7, minimum spot-5, minimum height 10AU, minimum area 50AU, maximum height 990 AU with absorption unit[5,6].

RESULTS AND DISCUSSION

Organoleptic evaluation:

Organoleptic features of *Pandughni Vati* were observed like light Grayish brown, Astringent-Bitter in taste and solid consistency with rough surface (**Table 3**).

Microscopic evaluation:

Crystals with tannin, epidermal cells, scleroids (*Amalaki)*, Scleroids, stone cells, rostte crystel with trichome (*Bibhitaki),* acicular crystals, lignified paranchymal cork, stone cells (*Punarnava),* Annular vessels, scleroids, stone cells (*Vidanga),* Oleoresins, scleleriform vessels, simple starch grainsare (*Shunthi)*. Spiral Vessles, starch grains & prismatic crystals, stone cells (*Maricha)*, Parenchyma, starch grain, prismatic crystals & epidermal cells, Stone cells (*Pippali)*, Fragments of fiber, lignified cork, and pitted

vessels (*Katuki)* and Acicular crystals, stomata, vascular strands (*Kumari)* were observed microscopically. Microphotographs are exposed in (**Figure I (1-27)**).

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 extract and methanol soluble extract values were found to be 31.26 % w/w and 17.12 % w/w respectively. Details are shown in (**Table 4**).

High- Performance Thin Layer Chromatography Study:

Densitometric scanning of the HPTLC pattern showed 7 spots corresponding to hR_f values 0.06, 0.19, 0.41, 0.57, 0.65, 0.83, 0.92 in short wave UV 254 nm and 3 spots corresponding to hR_f values 0.06, 0.19, 0.91 in long wave UV 366 nm. (**Table 5**)

Table 1: Ingredients of Pandughni Vati

S. No	Ingredients	Botanical name	Part	Part used
1	Amalaki	*Emblica officinalis* Gaertn.	1	Fruit
2	Bibhitaki	*Terminalia belerica* Roxb.	1	Fruit
3	Punarnava	*Boerhaavia diffusa* Linn.	1	Whole plant
4	Vidanga	*Embelia ribes* Burm. f.	1	Fruit
5	Shunthi	*Zingiber officinale* Rosc.	1	Rhizome
6	Maricha	*Piper nigrum* Linn.	1	Fruit
7	Pippali	*Piper longum* Linn.	1	Fruit
8	Katuki	*Picrorhiza kurroa* Royle ex Benth.	1	Rhizome

Table 2: Bhavana Dravya

S.No	Drug	Latin name	No. of Bhavana
1	Kumari	*Aloe barbadensis* Mill	1
2	Gomutra	*Cow's urine*	1
3	Punarnava	*Boerhaavia diffusa* Linn.	2
4	Amalaki	*Emblica officinalis* Gaertn.	2

Table 3: Organoleptic Features of Pandughni Vati

S. No	Characters	Observed
1	Texture	Rough
2	Colour	Light Brown
3	Odour	Pungent (mild)
4	Taste	Astringent- Pungent
5	Consistency	Solid

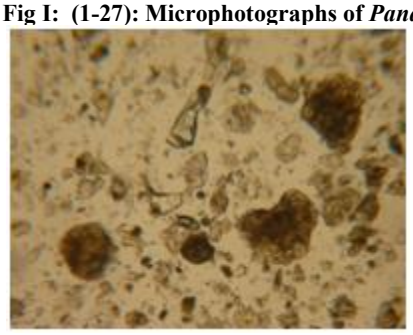
Table 4: Physico-Chemical Parameters Of Pandughni Vati

S. No	Parameters	Pandughni Vati
1	Uniformity of Tab.	
	A-Average weight	520 mg
	B-Highest weight	567 mg
	C-Lowest weight	486 mg
2	Tab hardness	0.80 kg/cm^2
3	Disintegration Time	1 min.
4	Loss of drying at 110^0 C	2.77 % w/w
5	Ash value	19.34 % w/w
6	Water Soluble Extract	31.26 % w/w
7	Methanol Soluble Extract	17.12 % w/w
8	pH (10% aqua solution)	4.04

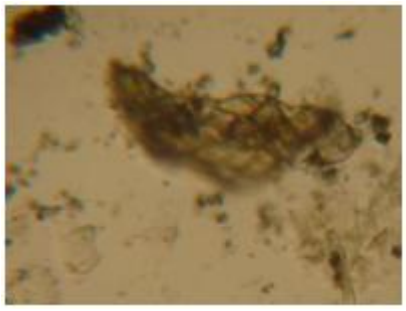
Table 5: Chromatographic Fingerprinting Of *Pandughni Vati* Meoh Extract On Silica Gel Gf 60 Plates

Solvent System	Short UV Radiation (254 nm)		Long UV Radiation (366 nm)		After Derivetization Vanillin:H_2so_4 (9:1 V/V) Followed By 105^0 C in Oven	
	No of spots	R_f	No of spots	R_f	No of spots	R_f
Toulene:Ethyl Acetate:Acetic Acid (7:2:1 v/v)	7	0.06, 0.19, 0.41, 0.57, 0.65, 0.83, 0.92	3	0.06, 0.19, 0.91	4	0.09, 0.22, 0.43, 0.46

Fig I: (1-27): Microphotographs of *Pandughni Vati*

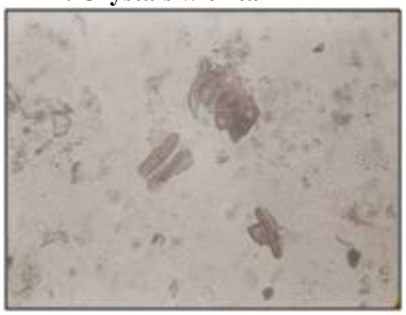


1. Crystals with tannin

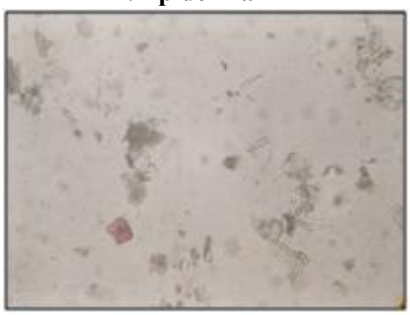


2. Epidermal

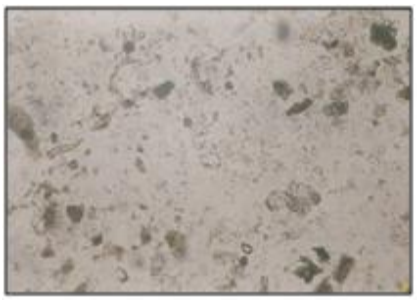
3. Scleroids



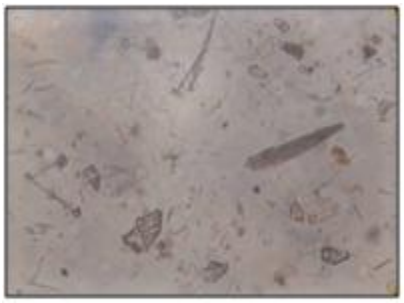
4. Scleroids



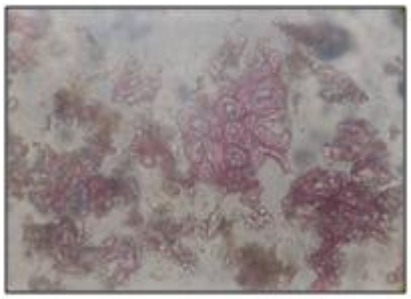
5. Stone cells



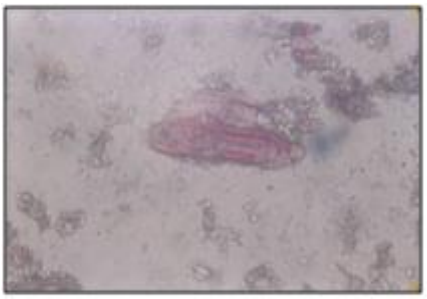
6. Rostte crystel with trichome



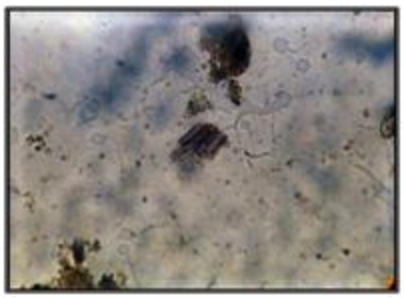
7. Acicular crystals



8. Lignified paranchymal cork



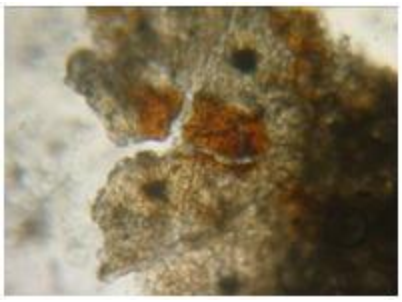
9. Sone cells



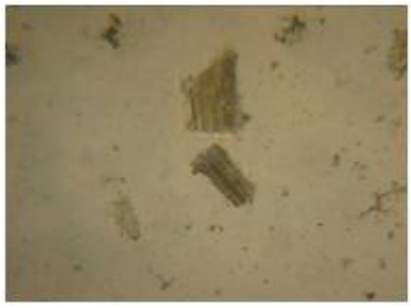
10. Annular vessels

11. Scleroids

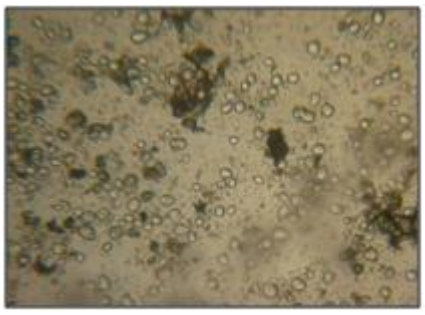
12. Stone cells



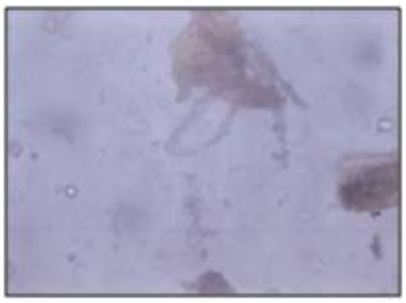
13. Oleoresins



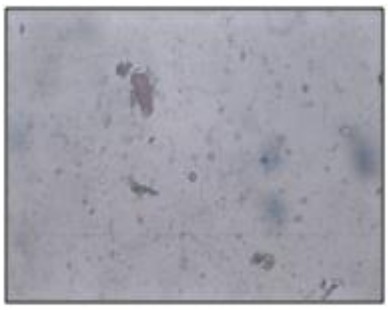
14. scleleriform vessels



15. simple starch grains

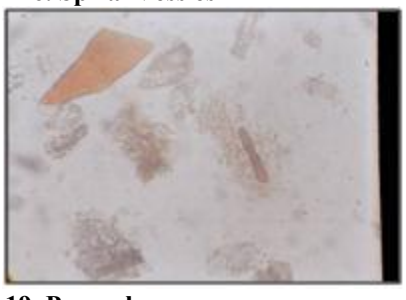


16. Spiral Vessles

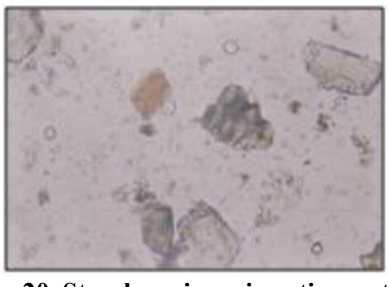


17. Starch & Prismatic crystals

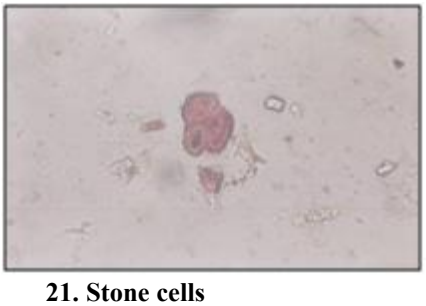
18. Stone



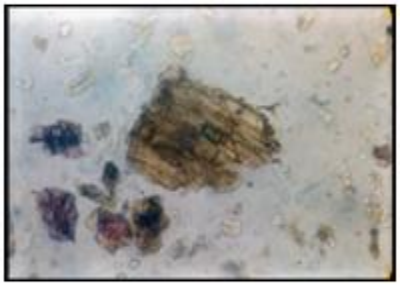
19. Parenchyma



20. Starch grain, prismatic crystals & Epidermal cells

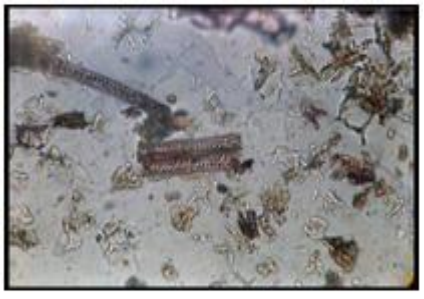


21. Stone cells

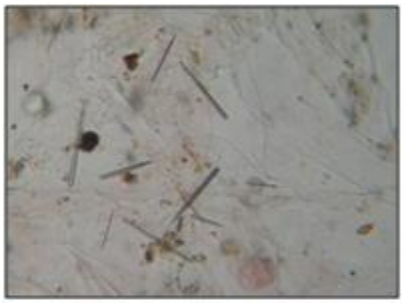


22. Fragments of fiber

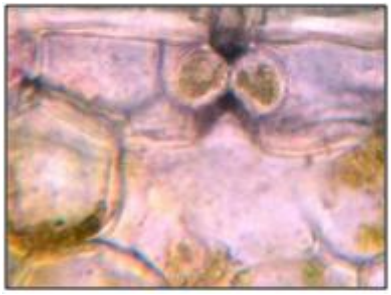
23. Lignified cork



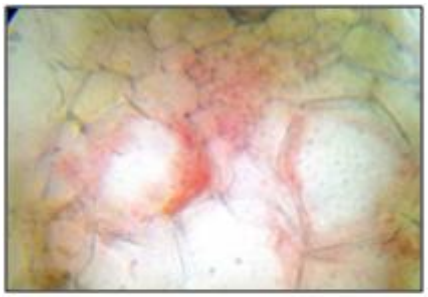
24. Pitted vessels



25. Acicular crystals



26. Stomata



27. Vascular strands

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