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# PHARMACOGNOSTICAL AND PHARMACEUTICAL ANALYSIS OF *PUNARNAVA MANDURA* -AN AYURVEDIC HERBOMINERAL FORMULATION FOR ANEMIA ASSOCIATED WITH NON-DIALYSIS DEPENDENT CHRONIC KIDNEY DISEASE (NDD- CKD) (KAPHAJA PANDU)

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## ABSTRACT

**Background:** *Punarnava Mandura* is mentioned by Acharya Charaka as a drug for the management of *Pandu and Sotha*. So for initialization of standardization and assurance of the quality of herbal compounds pharmacognostical and pharmaceutical analysis should be done. **Methods:** *Punarnava Mandura* was subjected to microscopic evaluation for pharmacognostical and physicochemical analysis like Loss on drying, total ash, water soluble extract, alcohol soluble extract and ph value. **Results:** Pharmacognostical study showed the presence of certain identifying characters of all the ingredients of *Punarnava mandura like Punarnva, Trikatu, Triphala, Vidanga, Kushtha, Devdaru, Trivruta, Haridra, Chavya, Daruharidra etc*. As per the preliminary physiochemical analysis, loss on drying percentage of the *Punarnava Mandura* was 2.67 % w/w, pH value was 6, total ash value was 68.7 % w/w, Water soluble extractive was 23%w/w and Methanolsoluble extractive was 12.6 w/w. **Conclusions:** Pharmacognostical and physico-chemical observations revealed the

specific characteristics of all active constituents of *Punarnava mandura* confirmed the purity and genuinity of the drug.

**KEYWORDS:** *Punarnava mandura*, Anemia associated with NDD -CKD, *Kaphaja Pandu*, Pharmacognosy, Pharmaceutical analysis.

## INTRODUCTION

In non-dialysis-dependent CKD, anemia is a multifactorial and complex condition in which several dysfunctions dynamically contribute to a reduction in circulating hemoglobin (Hb) levels in red blood cells. Anemia is common in CKD and represents an important and modifiable risk factor for poor clinical outcomes. There is growing evidence that oral compounds can have a deleterious effect on gut microbiota which may worsen uremic dysbiosis.[1] Whether oral iron-induced changes in gut microbiota increase uremic toxins production and/or inflammation in CKD remain to be elucidated. Further, there are raised concerns about IV iron formulation such as enhanced oxidative stress, endothelial dysfunction, or the potential role in favoring infection. Further, IV iron administration has been associated with an increased risk of hypotension, headaches, or hypersensitivity reactions. Therefore, an important challenge to researchers is identifying low-cost and effective plant-based therapeutic options for CKD patients in poorer countries and disadvantaged populations.

In Ayurveda, this condition may bear a symptomatic resemblance to *Kaphaja Pandu*. It has been observed that *Punarnava Mandura* is effective in iron deficiency anemia among all age groups; pediatric, geriatrics and adult age groups.[2] *Triphala*, *Trikatu*, *Chitraka*, *Vidanga* and *Pippalimula* have appetizing, digestive, and carminative properties which improve digestive power and ultimately absorption of the drug. *Amalaki*, *Danti*, *Pippali*, *Punarnava*, *Kushta*, and *Daruharidra* are documented as drugs having immunomodulatory action and antioxidant properties having the potential of providing beneficial health effects in anemia. In the traditional medical system, *Punarnava* is widely recognized for both its diuretic and renoprotective properties.

In the case of internal administration of herbal drug, it should be safe, effective and free from adulteration, with appropriate quantity and ingredients. It is difficult to identify the herbal drug in dry or powdered form. So, it is a need of time to set proper parameters for standardization of herbal drugs. Pharmacognostical studies reveal plant identification and set

parameters for standardization which can be done in the case of herbal traditional medicine. Generally, the physiochemical analytical study of drugs helps to interpret the pharmacokinetics and pharmacodynamics involved. With the help of physiochemical analytical studies, it is possible to standardize the drug and differentiate the adulterants. It is necessity of time in the field of Ayurveda to go for quality control of the raw drugs as well as final products using modern parameters which provides credibility to Ayurvedic medicines and also help in the globalization of Ayurveda. Hence to evaluate the Authenticity of *Punarnava mandura* through various pharmacognostical procedures, and to develop the pharmacognostical and phytochemical profile of *Punarnava Mandura* the present study was carried out.

## MATERIALS AND METHOD

Collection, identification and authentication of raw drugs.

The raw materials were procured from the pharmacy of ITRA Jamnagar, authentic source and the raw drugs were identified and authenticated in the pharmacognosy laboratory of Institute of teaching and research in Ayurveda, Ministry of Ayush, Gov. of India, Jamnagar. The ingredients and part used of *Punarnava mandura* are given in Table 1.

**Table No. 1: Ingredients of Punarnava Mandura.**

| Drug | Botanical name | Family | Part used | Proportion |
|---|---|---|---|---|
| *Punarnava* | *Boerhaavia diffusa* Linn. | Nyctaginaceae | *Mula* (roots) | 1 part |
| *Trivruta* | Operculina turpethum Silva Manso | Convolvulaceae | *Mula* (roots) | 1 part |
| *Shunthi* | *Zingiber officinale* Roscoe | Zingiberaceae | *Kanda* (stem) | 1 part |
| *Maricha* | *Piper nigrum* Linn. | Piperaceae | *Phala* (fruit) | 1 part |
| *Pippali* | *Piper longum* Linn. | Piperaceae | *Phala* (fruit) | 1 part |
| *Vidanga* | *Embelia ribes* Burm.f. | Myrsinaceae | *Phala* (fruit) | 1 part |
| *Devdaru* | *Cedrus deodara* Loud. | Pinaceae | *Phala* (fruit) | 1 part |
| *Chitraka* | *Plumbago* zylenica Linn. | Plumbaginaceae | *Mula* (roots) | 1 part |
| *Haritaki* | *Terminalia chebula* Retz. | Combretaceae | *Phala* (fruit) | 1 part |
| *Bibhitaka* | *Terminalia bellirica* Roxb. | Combretaceae | *Phala* (fruit) | 1 part |
| *Amalaki* | *Emblica officinalis* | Euphorbiaceae | *Phala* | 1 part |

| | | | | |
|---|---|---|---|---|
| | Gaertn. | | (fruit) | |
| *Kushtha* | *Saussurea lappa* | Asteraceae | *Mula (root)* | 1 part |
| *Haridra* | *Curcuma longa* Linn. | Zingiberaceae | *Kanda* (stem) | 1 part |
| *Daruharidra* | *Berberis aristata* | Berberidacece | *Mula (root)* | 1 part |
| *Danti* | *Baliospermum montanum* Muell. | Euphorbiaceae | *Mula* (root) | 1 part |
| *Chavya* | *Piper chaba* Hunter. | Piperaceae | *Phala* (fruit) | 1 part |
| *Kalingaka* | *Holarrhena antidysenterica* Wall. | Apocynaceae | *Phala* (fruit) | 1 part |
| *Pippali* | *Piper longum* Linn. | Piperaceae | *Phala* (fruit) | 1 part |
| *Pippalimula* | *Piper longum* Linn. | Piperaceae | *Mula* (roots) | 1 part |
| *Musta* | *Cyperus rotundus* Linn. | Cyperaceae | *Kanda* (stem) | 1 part |
| *Mandura* | _ | _ | _ | 2 parts |
| *Gomutra* | Cow's urine | _ | – | Quantity sufficient |

## METHOD OF PREPARATION

### 1) *Punarnava Mandura*

The drug will be collected and prepared in the pharmacy, ITRA, Jamnagar, following the standard method of preparation of tablet as per API.[3] The prepared drugs will be stored under aseptic and good hygienic conditions. *Punarnava*, *Trivruta*, *Vyosha* (*Shunthi*, *Maricha*, *Pippali*), *Vidanga*, *Devdaru*, *Chitraka*, *Kustha*, *Haridra*, *Daruharidra*, *Triphala* (*Haritaki*, *Bibhitaki*, *Amalaki*), *Danti*, *Chavya*, *Kalingaka*, *Pippali*, *Pippalimula*, and *Musta* will be taken in 1-1 part and will be converted into fine powders through sieve number 85. Further, *Mandura Bhasma* will be taken into double the quantity of the above-mentioned drug. Further, *Gomutra* will be added to *Mandura Bhasma* and heated till a paste is formed. After this, the mixture will be allowed to cool down. Then the fine powders of the above drugs will be mixed and a binding agent will be added. From this mixture, *tablet* of 500 mg quantity will be prepared and stored under hygienic conditions.

## PHARMACOGNOSTICAL STUDY

The pharmacognostical study was divided in to organoleptic study and microscopic study of the finished product.

**Organoleptic study:** The genuinity of the polyherbal formulation can be fined with organoleptic characters of the given sample. Organoleptic parameters comprises of color, odor and touch of *Punarnava Mandura* which was scientifically studied as per the standard references.

**Microscopic study:** *Punarnava Mandura* ingredients was taken in powder form and dissolved with water and microscopy of the sample was done without stain and after staining with phloroglucinol and HCl. Microphotographs of all ingredients of *Punarnava Mandura* were also taken under Corl-zeisstrinocular microscope.[4]

**Physico-chemical analysis**-With the help of various standard physico-chemical parameters, *Punarnava Mandura* was analyzed. The common parameters mentioned for Tablet in Ayurvedic Pharmacopeia of India, and CCRAS, guidelines are loss on drying, total ash, water soluble extract, alcohol soluble extract and ph value.

## OBSERVATION AND RESULTS

The initial purpose of the study was to confirm the authenticity the drugs used in preparation of *Punarnava Mandura*. For this, all ingredients was subjected to organoleptic and microscopic evaluations 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 color; odor and taste of the *Punarnava Mandura* were recorded and are placed in Table 3 and 4.

**Table 2: Organoleptic Characters of *Punarnava Mandura.***

| Parameter | Results |
|---|---|
| Color | Light brownish |
| Odor | Like cow’s urine |
| Touch | Hard |
| Taste | Salty astringent |

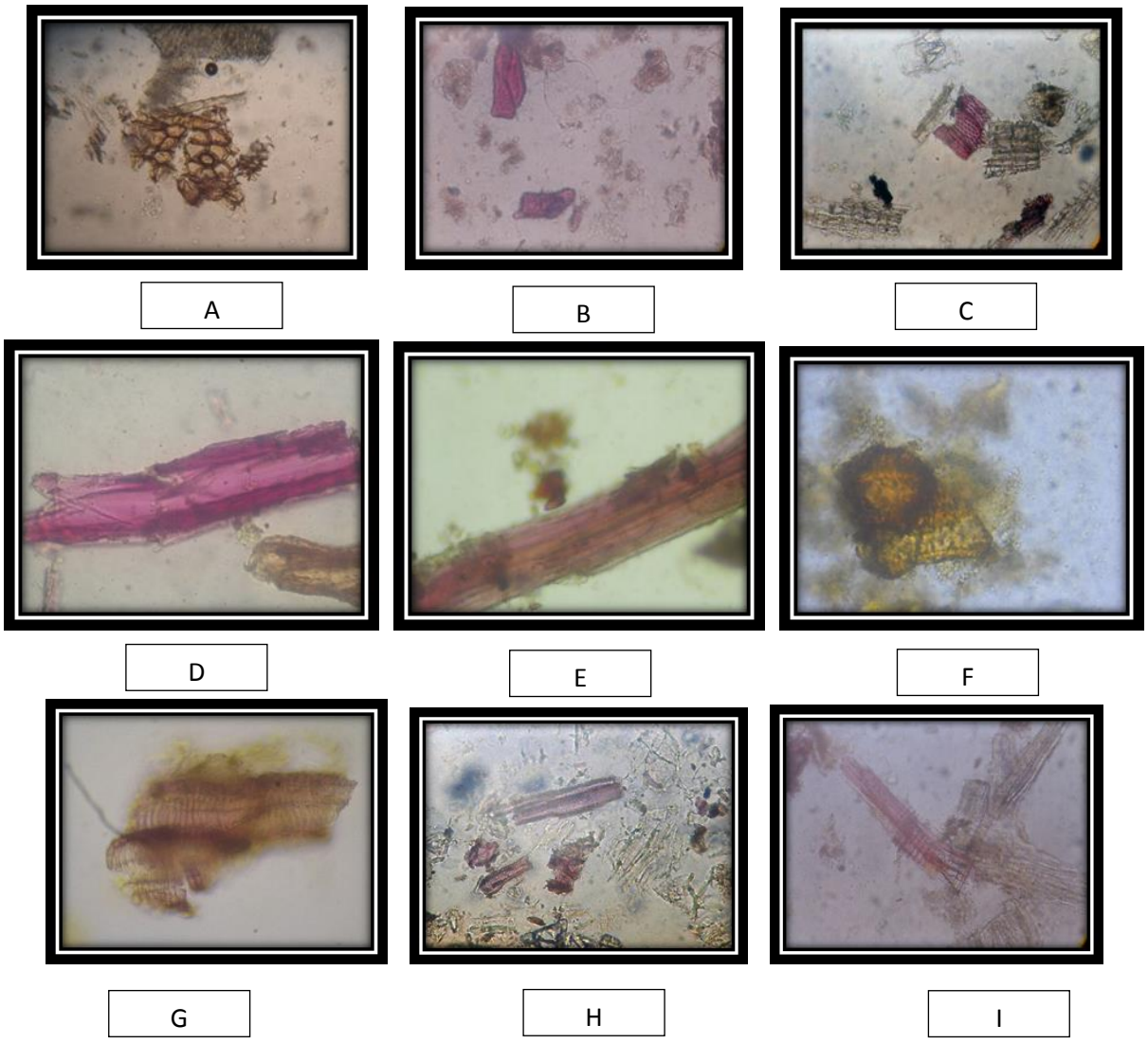
**Microscopic evaluation:** Microscopic evaluation was conducted by dissolving the ingridents of *Punarnava Mandura* in the distilled water and studied under microscope for the presence of characteristics of ingredient drugs. The diagnostic characters are Cork cell of Punarnava (Figure 1 A), stone cell of chavya (Figure 1 B), pitted vessels of trivruta(Figure 1 C), lignified fibers of devdaru (Figure 1 D), fibers of *vidanga* (Figure 1 E), brown content with stone cell of chitraka (Figure 1 F),annular vessel of kustha(figure 2 G), annular vessel of pippalimula (figure 2 H), fibers through medullary rays of danti (figure2 I), group of stone

cell of maricha (figure 2 J), olioresin of haridra (figure 2 K), pitted vessel of amalaka(figure 2 L), trichome of Vibhitaki (figure 2 M), Starch grain of shunthi (figure 2 N) and scleroid of haritaki (figure 2 O).

**Physio-chemical parameters**: Physio-chemical parameters like Loss on drying, Specific gravity, Acid value, Saponification & Refractive index were found within the normal range. Details is shown in the Table 5.

**Table 3: Physico-Chemical Parameters of *Punarnava Mandura.***

| S. N. | Parameters | *Puanrnava mandura* |
|---|---|---|
| 1 | Loss on drying | 2.67% |
| 2 | Ash value | 68.77% |
| 3 | Water soluble extract | 23.00 |
| 4 | Methanol soluble extract | 12.6 |
| 5 | pH value | 6 |



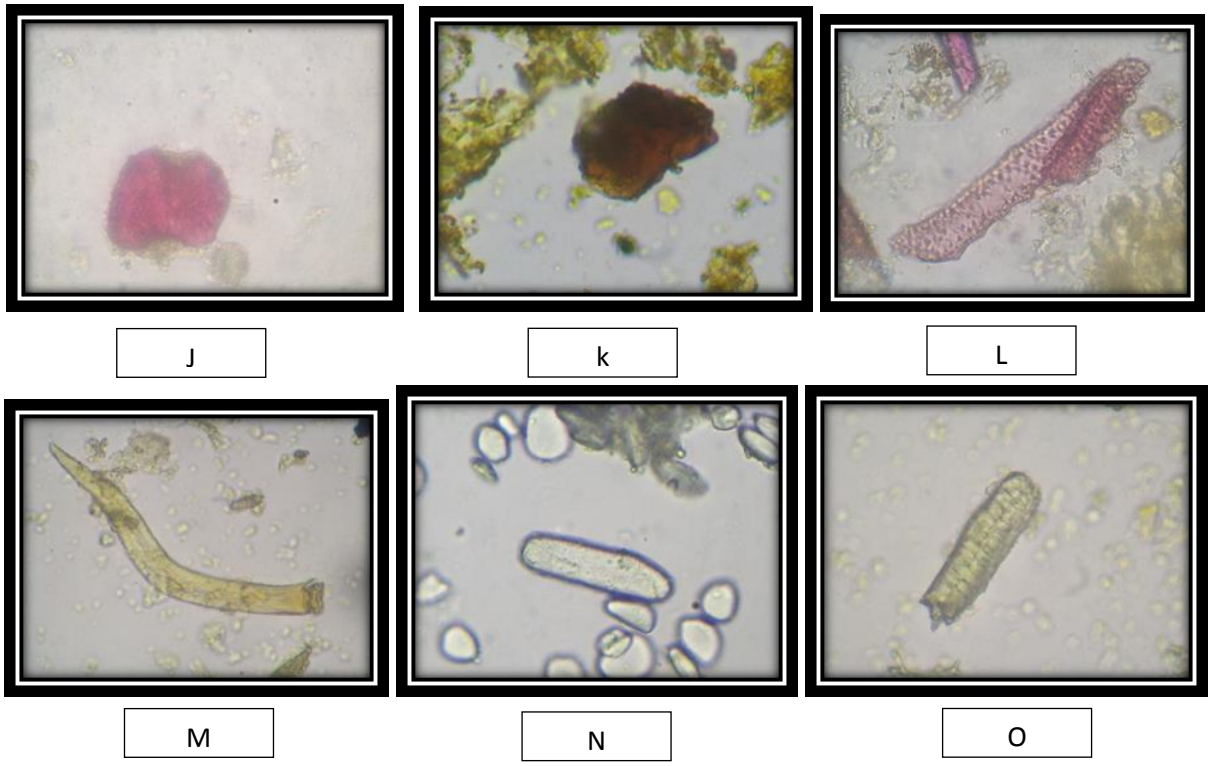



**Figure 1.**

## DISCUSSION

Study on *Punarnava Mandura* was a step towards pharmacognostical and pharmaceutical standardization of the drug. The pharmacognostical study revealed the presence of the diagnostic characters of *Punarnava Mandura* like are. The diagnostic characters are Cork cell of *Punarnava*, stone cell of *Chavya*, pitted vessels of *Trivruta*, lignified fibers of *Devdaru*, fibers of *Vidanga*, brown content with stone cell of *Chitraka*.

This confirms the presence of all ingredients of raw drugs in the final product and there is no major change in the microscopic structure of raw drug during the pharmaceutical process of preparation of final product, this showed the genuinity of the final product. All the physio-chemical parameters, loss on drying percentage of the *Punarnava Mandura*- 2.67 % w/w, pH value -6, total ash value - 68.7% w/w, Water soluble extractive- 23%w/w and Methanol soluble extractive - 12.6 w/w were analyzed and found to be in normal referential range.

## CONCLUSION

The pharmacognostical and physico-chemical analysis of *Punarnava Mandura* confirmed the purity and genuinity of the drug. As no standard fingerprint is available for this formulation, an attempt has been made to evolve pharmacognostical and physico-chemical profiles of

*Punarnava Mandura*. Information acquired from this study may be beneficial for further research work and can be used as a reference standard for quality control researches.

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