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Review Article

A Review of Literature on Punarnavadi Mandura: An Ayurvedic Herbo-Mineral Preparation

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ABSTRACT

Background: Punarnavadi Mandura is an Ayurvedic herbo-mineral preparation primarily used as an anemia correcting agent while its role in other clinical conditions has also been studied. **Objective:** To understand the role of Punarnavadi Mandura in controlling anemia and other clinical conditions and its pharmacognostical and phytochemical properties. **Methodology:** A search of literature was carried out using "Punarnavadi Mandura" as the only key word and a total of 33 literatures were obtained of which 5 titles were finally selected for the review. **Results and Discussion:** Of the 5 studies identified 3 studies focused on the role of Punarnavadi Mandura as an anemia correcting agent, one study identified its role in other clinical condition (Diabetic Nephropathy), one study focused on the pharmacognostical and phytochemical analysis while one study focused on both the analysis of pharmacognostical and phytochemical properties and its role as an anemia correcting agent. As per these studies Punarnavadi Mandura is an effective remedy for iron deficiency anemia (IDA) of all ages. Statistically significant result has been obtained in subjective and hematological parameters. Furthermore its role in other clinical conditions has also been found effective, especially in Diabetic Nephropathy (DN), as a *Naimithika Rasayana*. Punarnavadi Mandura is currently a part of National health programme and is included in ASHA drugs kit for the management of IDA at community level. **Conclusion:** Given the efficacy of Punarnavadi Mandura in IDA, at all ages, its usage should be fostered more in Indian communities especially the rural communities where IDA is endemic.

Key words: Anti-anemic, *Naimithika Rasayana*, Pharmacognostical, Phytochemical, Iron Deficiency Anemia, ASHA drugs kit.

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INTRODUCTION

Punarnavadi Mandura is an Ayurvedic herbo-mineral preparation primarily used as an anemia correcting agent while its role in other clinical conditions has also been studied. The role of Punarnavadi Mandura as an anemia correcting agent has been studied by different authorities in India.[1-4] The classical description of Punarnavadi Mandura is found in one of the major classics of Ayurveda, Charak Samhita. Acharya Charak has described the role of Punarnavadi Mandura as an anemia correcting agent in his classical treatise, Charak Samaita, in *Chikitsa Stana*.[5] The ingredients described in Charak Samhita for the preparation of Punarnavadi Mandura have been delineated in Table 1. Furthermore a brief description of the preparation of Punarnavadi Mandura is described in Table 2. Punarnavadi Mandura act as an anemia correcting agent possibly by its effect on *Srotosa* (micro channels) and *Agni* (digestive fire mechanism) and thereby enhancing digestive capacity owing to *Deepana* (appetizer), *Pachana* (digestive) properties.[6] In addition to anemia its role in other clinical conditions has been studied as well[7] Punarnavadi Mandura is being used for many other clinical conditions which include malabsorption syndrome, inflammation, splenic disease, intermittent fever, haemorrhoids, diseases of skin, and helminthiasis/worm infestation.[5,8] Furthermore Punarnavadi Mandura is currently a part of national health programme in India. It has been included in the ASHA drugs kit for the management of iron deficiency anemia (IDA) at community level in India. This drug has been included with the initiation of National Rural Health Mission (NRHM) in India under the aegis of "Mainstreaming of AYUSH and Revitalization of Local health Traditions" in India.[9,10] With this background a review was carried out in order to understand the role of Punarnavadi Mandura in anemia and other pathological conditions.

OBJECTIVE

The main objective of this literature review is;

- To understand the role of Punarnavadi Mandura as an anemia correcting agent,
- To understand the role of Punarnavadi Mandura in other clinical conditions and
- To understand the pharmacognostical and phytochemical properties of Punarnavadi Mandura.

METHODOLOGY

A manual search strategy was adopted to obtain research papers on Punarnavadi Mandura. The search was primarily carried out using PUBMED and Google Scholar search engines and the only key word used for the purpose of search was "Punarnavadi Mandura" and was done deliberately in order to obtain research papers particularly on Punarnavadi Mandura only. A total of 33 articles were obtained by the end of this search process and 5 full texts articles were finally selected for the purpose of this review. Figure 1, shows the flowchart of selection of articles for the purpose of this review.

Inclusion and exclusion criteria

Articles published in English language only were included in the review. Furthermore original researches were only recruited for the purpose of review which precludes review articles and theoretical research. The studies those did not fall in these categories were excluded from review.

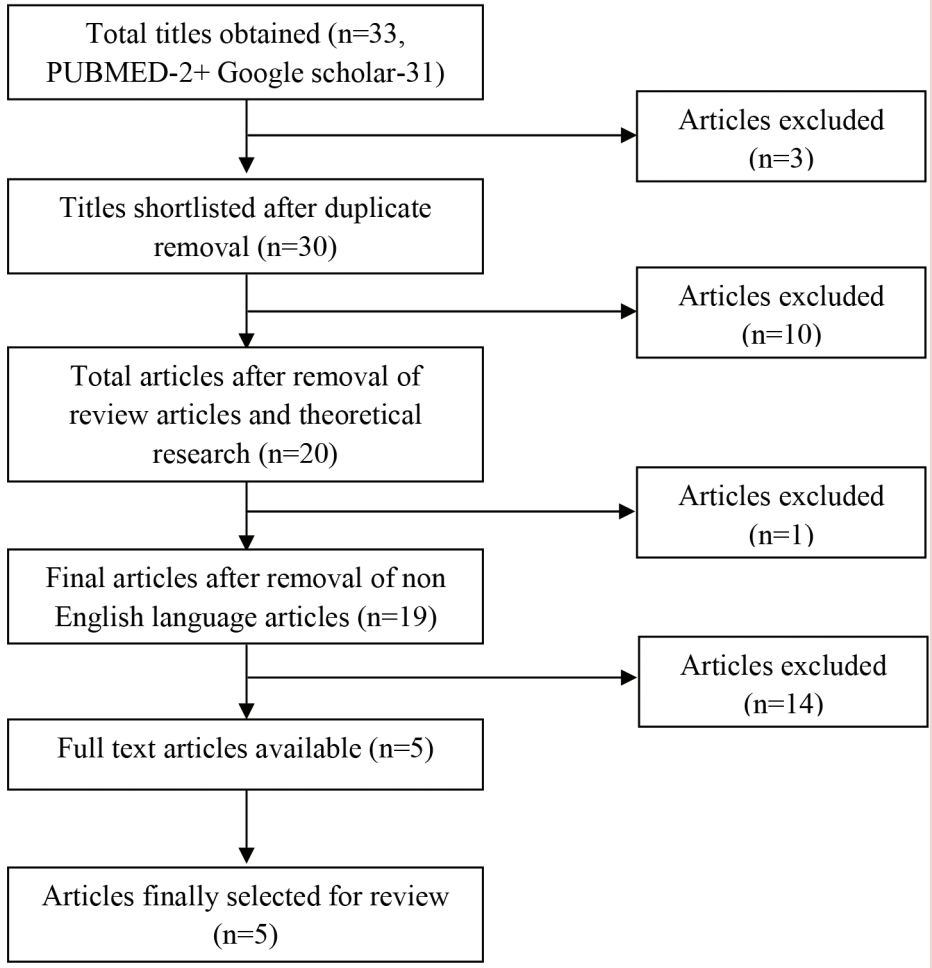

Figure 1: Flowchart showing the selection of articles for review.

RESULTS

Of the 5 studies identified 3 studies (n=5) focused on the role of Punarnavadi Mandura as an anemia correcting agent (Table 3), 1 study (n=5) identified its role in other clinical condition (Table 4), 1 study (n=5) focused on the pharmacognostical and phytochemical analysis while 1 study (n=5) focused on both the analysis of pharmacognostical and phytochemical properties (Table 2) and its role as an anemia correcting agent.

DISCUSSION

Punarnavadi Mandura is an effective herbo-mineral preparation for the management of Iron deficiency anemia (IDA). Furthermore it was observed that this drug is effective in IDA among all age groups; pediatric, geriatrics and adult age groups.[6,12,13] Studies also reveal that this drug is well tolerated among the patients without any side effects and untoward effects compared to allopathic drug in one of the clinical trials.[12] One of the advantages of Ayurvedic preparations is that most of these drugs are administered with some vehicle which improves the efficacy of the parent drug and Punarnavadi Mandura is not an exception to this principle. Punarnavadi Mandura is preferably administered with butter milk which is acidic pH and contains lactic acid. Iron absorption is aided by decreased pH.[14] Furthermore it may also possible that iron combines with lactic acid to form ferrous lactate before absorption. Modern medical system uses ferrous lactate for the management of Iron deficiency anemia.[15] Alternatively it may also happen that the proteins of butter milk or the amino acids released after digestion may combine with iron before the absorption takes place. This point of view is also supported by the World Health Organization as it supports the use of meat and other proteins for the absorption of iron.[16] However, Ayurveda has a different view on the role of Punarnavadi Mandura in controlling anemia which is primarily directed towards Agni (Digestive fire).[6] But this concept is also indirectly related to the mechanism of absorption of iron in the gastro-intestinal tract by the process of *Deepana* and *Pachana*.[6,17]

The study that focused on geriatric anemia has offered a probable explanation of the action of Punarnavadi Mandura among geriatric patients suffering from anemia. Triphala, Trikatu, Chitraka, Vidanga and Pippalimula have appetizer, digestive and carminative properties which improves digestive power and ultimately absorption of the drug. The components like Trivrita, Haritaki and Danti act as laxative which help in relieving constipation mainly found in old age. Haridra, Amalaki, Pippali, Punarnava and Trivrita were mentioned as Panduhara (anti-anemic) by various Acharyas. Amalaki, Danti, Pippali, Punarnava, Kushtha and Daruharidra are documented as drugs which are having immunomodulator and antioxidant properties having the potential of providing beneficial health effects in geriatric anemia.[6]

Table 1: Composition of Punarnavadi Mandura

Ingredients	Latin name	Parts used	Proportion
Punarnava	*Boerhaavia diffusa Linn.*	Root	1 part
Trivrita	*Operculina turpethum Linn.*	Root	1 part
Shunthi	*Zingiber officinale Rosc.*	Rhizome	1 part
Maricha	*Piper nigrum Linn.*	Fruit	1 part
Pippali	*Piper longum Linn.*	Fruit	2 parts
Vidanga	*Embalia robusta C. B. Clarke*	Fruit	1 part
Devdaru	*Cedrus deodara (Roxb.)*	Wood	1 part
Kushtha	*Saussurea lappa C.B. Clarke*	Root	1 part
Haridra	*Curcuma longa Linn.*	Rhizome	1 part
Daruharidra	*Berberis aristata DC.*	Root	1 part
Amalaki	*Embalica officinalis Gaertn.*	Fruit	1 part
Bibhitaki	*Terminalia bellirica Roxb.*	Fruit	1 part
Haritakai	*Terminalia chebula Retz.*	Fruit	1 part
Danti	*Baliospermum montanum (Willd.)*	Root	1 part
Chavya	*Piper chaba Hunter.*	Root	1 part
Indrayava	*Holarrhena antidysenterica (Roxb. ex Flem.) Wall.*	Seed	1 part
Pippalimula	*Root of Piper longum Linn.*	Root	1 part
Musta	*Cyperus rotundus Linn.*	Rhizome	1 part
Chitraka	*Plumbago zeylanica Linn.*	Root	1 part
Mandura Bhasma	Incinerated red oxide of iron ($Fe_2O_3H_2O$)		40 parts
Gomutra	Cow's urine		Q. S.

Table 2: Pharmacognostical and Phytochemical analysis of Punarnavadi Mandura

Author	Journal and YOP	Study Type	Methodology	Major outcomes
Kori, V. K., Patel, K. S., Shukla, V. J., and Harisha, C. R[11]	Int. J Res. Ayurveda Pharm. 2012; 3(2):215-221.	Laboratory Investigation	Punarnavadi Mandura vati was prepared by the following process and its phramacognostical and pytochemical analysis was carried out. The ingredients mentioned in Table 1, were cleaned, dried, powdered and passed through sieve number 85. Mandura bhasma was mixed with cow urine and heated. 5% of gum acacia was mixed as binding agent. The mixture was converted in to granules and then punched in to 500 mg tablets by tablet making machine.	The organoleptic assessment shows that Punarnavadi Mandura vati is light reddish brown in color, gomutra gandhi (smells like cow urine), Astringent-bitter in taste and solid in consistency with rough surface. Physiochemical parameters-water soluble extract and methanol soluble extract were found to be 13.09% w/w and 6.37% w/w respectively.
Sharma DC, Chandiramani D, Riyat M, Sharma P.[12]	Indian Journal of Clinical Biochemistry. 2007; 22 (2):123-8.	Laboratory Investigation	The powdered drug was first ashed in a muffle furnace and the residue was digested in aqua-regia. The volume of the extract was reduced by boiling and then diluted by deionised water. The minerals-iron, copper, zinc, calcium and magnesium were determined by atomic absorption spectrophotometry, while sodium and potassium were in flame photometer. The analysis of carbon, hydrogen and nitrogen was done by RSIC of Central Drug Research Institute, Lucknow.	The percentage distribution of elemental composition of Punarnavadi Mandura is as follows; Carbon-23.61%, Hydrogen-3.02%, Nitrogen-1.44%, Iron-20.00%, Copper-0.01%,Z inc-0.01%, Calcium-3.81%, Magnesium-1.03%, Sodium-0.50%, Pottasium-1.25%, Total-54.68%, Other elements such as Oxygen, Sulphur etc.-45.32

*RSIC-Regional Sophisticated Instrumentation Centre.

Table 3: Studies showing the role of Punarnavadi Mandura as an Anemia correcting formulation

Author	Journal and YOP	Study Type	Methodology	Major outcomes
Sharma DC, Chandiramani D, Riyat M, Sharma P.[12]	Indian Journal of Clinical Biochemistry. 2007; 22 (2):123-8.	Clinical trial conducted at hospital setting	20 patients (8 male+12 female) were administered with 125 mg of Punarnavadi Mandura (containing 100 mg of elemental iron) for 30 days who were undergoing treatment for moderate to severe anemia by Ayurvedic Physicians. Each patient was given 125 mg twice daily with buttermilk or water thus consuming 500 mg of this tablet per day.	The initial Hb gm% among the patients ranged between 3.2 to 9.8 with a mean of 7.50 gm% The percentage changes in hematological and iron parameters after treatment are as follows; Hb-48.0%, PCV-23.1%, TRBC-15.0%, MCV-7.5%, MCHC-20.7%, MCH-30.3%, PI-53.5%, TIBC-(-8.7%), PS-68.0% and FER-14.9%. The Hb regeneration per day for Punarnavadi Mandura was 0.12.
Pandya MG, Dave AR[6]	Ayu 2014;35:252-60	Hospital based clinical trial	50 clinically diagnosed geriatric anemia cases were administered with 500 mg of Punarnadi Mandura in two equally divided doses post lunch and dinner with butter milk for 90 days.	Statistically significant results were obtained in all chief complaints such as Aruchi (95.38%), Daurbalya (94.59%), Pindikodwestana (93.46%), Jwara (80%) and Bhrama (82.43%) except in Akshikuta Shotha (29.63%) however hematological parameters were not statistically significant.
Das A, Saritha S.[13]	Ancient Science of Life. 2013 Jan; 32(Suppl 2):S86.	Clinical Trail conducted at hospital setting	50 children of 10 to 14 years of age were administered with 500 mg of Punarnavadi Mandura and 10 ml of Dadimadi Grita twice daily with luke warm water for 84 days.	Statistically significant ($P < 0.001$) results were obtained after the administration of these two drugs among these children with IDA. Furthermore significant results were obtained in hemoglobin and other hematological parameters like MCHC, MCV, PCV, Reticulocyte Count, peripheral Blood smear, serum iron, serum Ferritin and Total Iron Bindinig Capacity in the treatment Group ($P < 0.001$).

*IDA: Iron Deficiency Anemia, TRBC: Total red blood cell, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, PCV: Packed cell volume, TIBC: Total iron binding capacity, Hb: Hemoglobin, FER: Plasma Ferritin, PS: Percent Saturation.

Table 4: Studies showing the role of Punarnavadi Mandura in other clinical conditions

Author	Journal and YOP	Study Type	Methodology	Major outcomes
Akarshini AM, Aruna[7]	Ayu 2014;35:378-83	Hospital based clinical trial	15 patients of either sex with Diabetic Nephopathy, aged between 20 and 80 years, were administered with a compound preparation containing Shilajatvadi Vataka-6 g twice daily in empty stomach with 100 ml of milk, Punarnavadi Mandura–2 g, 3 times a day after food, Pippali Mooladi Paneeya- along with Amrita and Bringaraja-30 ml, twice a day, before food, Triphala Guggulu-3 g, twice a day, after food for 48 days.	There was symptomatic improvement in Pada Shotha (pedal edema), Akshikoota Shotha (retroorbital edema). Statistically significant improvement was observed in Agni (gastric fire) status. Significant improvement was observed in micro-albuminuria in which the difference of pre and post test mean of 83.76 μg/24 h was observed

Amalaki is a rich dietary source of Vitamin C, a powerful water-soluble antioxidant, helps in increasing iron absorption from the gut.[18] One of the studies on Pippali suggests that, piperine gets absorbed very quickly across the intestinal barrier through the intracellular pathway. It may modulate membrane dynamics owing to its easy partitioning properties thus helping in efficient permeability across the barriers. In addition Pippali is said to be bio-availability enhancer of drug, further helping in easy assimilation of the drug components.[19]

Mandura Bhasma (incinerated form of iron−Fe_2O_3), by virtue of Rasa and Guna, pacifies aggravated Pitta and maintains the normalcy thereby improving the digestion and metabolism. The ferric and ferrous fractions of Mandura provide sufficient iron needed for normal erythropoiesis.[20] Furthermore the presence of erythropoietin hormone in cow urine helps in the improvement of anemia.[21]

In addition to the anti-anemic properties of Punarnavadi Mandura, it is also found effective in other clinical conditions, such as Diabetic nephropathy, as reported by one of the studies.[7] The study reported that the combination of Shilajatvadi Vataka, Punarnavadi Mandura, Pippali Mooladi Paneeya-along with Amrita and Bringaraja and Triphala Guggulu acted as a *Naimithika Rasayana* and helped in managing Diabetic nephropathy.[7] Naimithika Rasayana is a unique concept described in Ayurveda which promotes vigor and vitality and instills the ability to hold out disastrous outcomes of diseases.[22,23]

CONCLUSION

As per different studies Punarnavadi Mandura is effective against Iron deficiency anemia at all ages. Studies also reveal that it is well tolerated among patients without any side effects and untoward health effects

hence the same can effectively be used for IDA. Moreover Punarnavadi Mandura is also more efficacious compared to allopathic hematinics as per one of the studies. The use of this drug under national health programme in India also proves its efficacy in managing the IDA at community level especially in rural India. Hence this drug can be effectively used in rural India where the prevalence IDA is rampant.

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CONFLICT OF INTEREST

None Declared.

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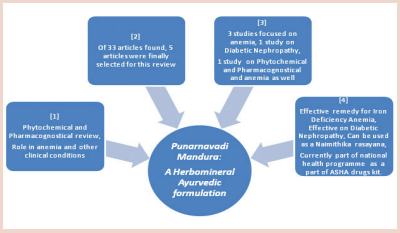
PICTORIAL ABSTRACT



SUMMARY

- *PunarnavadiMandura* (PM) is effective against Iron Deficiency Anemia (IDA)
- Statistically significant results were observed in subjective and hematological parameters for IDA.
- PMis effective in other clinical conditions as well; Diabetic Nephropathy (DN).
- PM can be used as a *NaimithikaRasayana* in combination with other drugs.
- PM is currently part of National health programme in India as a part of ASHA (Accredited Social Health Activist) drugs kit.

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