



Clinical Research

A comparative study on the effect of *Pandughnivati* and *Dhatrilauhavati* in the management of *Garbhinipandu* (Iron Deficiency Anemia)

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Abstract

The desire to have a healthy progeny is innate and very intense in every living being. The hectic life and tremendous stress in daily life has made the conception and continuation of pregnancy till term very difficult. Anemia is one of the common disease conditions, which affects a pregnant woman. In Ayurvedic classics anemia in pregnancy is taken under the *Rasa Pradoshajavikara*. It is clear that *Garbhavasthajanyapandu* occurs due to the fetal demands and improper functioning of the *Rasadhatu* leading to malnourishment of the body. A total of 26 patients were registered from out-patient department of *Streeroga* and *Prasutitantra*, out of which four patients discontinued. The remaining 22 patients were randomly divided into two groups; Group A (*n*-12) *Pandughnivati* two tablets of 500 mg tds and Group B (*n*-10) *Dhatrilauhavati* one tablet of 500 mg tds. *Dhatrilauhavati* was selected for the present study due to its *Pandughna*, *Prinana*, *Raktaprasadana* properties. In the present study, *Pandughnivati* a compound formulation developed by AYUSH department was administered for patients of group A. The results revealed that the over all clinical improvement was better in patients of Group B when compared to Group A. Hence it was concluded that *Dhatrilauhavati* was effective in treating anemia during pregnancy.

Key words: Anemia in pregnancy (iron deficiency anemia), *Dhatrilauhavati*, *Garbhinipandu*, *Pandughnivati*

Introduction

Acharya Harita has described eight *Garbhopadravas* in *Harita Samhita*^[1] and included *Vivarnatva*, which appears to be pallor that accompanies anemia. In the context of *Raktagulma*, *Acharya Kashyapa* has described furnished similar description during with *Garbhavastha* (pregnancy) which refers to *Garbhavasthajanya Pandu*.^[2] The growing fetus is nourished by the *Rasa* of mother.^[3] So, mother needs a better and more nutritious diet. *Kashyapa Acharya* has described that *Ahara Rasa* of the mother is divided into three parts. First part nourishes her own body, second part nourishes the *Garbha* (fetus) and the third part is utilized for the nourishment of *Stana* (breast).^[4] *Acharya Charaka* has also described "*Pandutva*" (pallor) as a *Rasapradoshaja Vikara*.^[5] It

is clear that *Garbhavasthajanya Pandu* occurs due to the fetal demands and improper functioning of the *Rasadhatu* leading to malnourishment of the body.

Maternal diet and maternal tissues store supply nutrients to the fetus. No mother will be able to meet the extra demand of nutrients by diet alone. This leads to certain pathological conditions in a pregnant woman. Among these, iron deficiency anemia is very common.

When the hemoglobin percentage (Hb%) decreases to less than 11 g/dl in 1st trimester and 3rd trimester or less than 10.5 g/dl in 2nd trimester in peripheral blood the condition is called anemia^[6] (Center for Disease Control and Prevention). In Asia and South Africa about 20% pregnant females die due to iron deficiency anemia^[7] (UNICEF, 1997). In India anemia in pregnancy is the most common high risk pregnancy having incidence of 40-80%. In western countries, this incidence is 10-20%.^[8]

The analysis of the formulations mentioned in the context of *Pandu* (anemia) indicates that they contain herbal ingredients like *Shunthi*, *Maricha* etc., which are known correctors of

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metabolism and enhancers of bio-availability of nutrients irrespective of the factor whether they contain metallic iron or not. Though metallic and non-metallic preparations are indicated in the management of *Pandu*, *Pandughnivati* had been selected, which can improve the metabolism and *Agni* and thus improve the *Pandu*. *Dhatrilauhavati* contains *Lauha Bhasma*, which is iron supplementation and *Deepana* which leads to proper metabolism and *Dhatuposhana* and other ingredients are *Rasayana* and *Shonitasthapana*, so, *Dhatrilauhavati*^[9] had been selected as a metallic preparation. The drugs were prepared in *Vati* form for easy administration.

Aims and Objective

To study the etiopathogenesis of *Garbhinipandu* (anemia in pregnancy).

To evaluate and compare the efficacy of *Pandughnivati* and *Dhatrilauhavati* in *Garbhinipandu* (anemia in pregnancy).

Materials and Methods

Patients

Patients attending the out-patient department of *Streeroga* and *Prasootitantra*, those fulfilling the criteria for the selection were selected for the study. A detailed history was taken according to the proforma specially prepared for this purpose.

Drugs

Pandughnivati and *Dhatrilauhavati* were prepared in pharmacy of Gujarat Ayurved University, Jamnagar.

Pandughnivati contains *Amalaki*, *Bibhitaki*, *Punarnava*, *Vidanga*, *Shunthi*, *Maricha*, *Pippali* and *Katuki* in an equal amount. *Bhavana* of *Kumari Swarasa* (one time), *Gomutra* (one time), *Punarnava* (two times) and *Amalaki* (two times) *Swarasa* was given during preparing the *Vati*.

Dhatrilauhavati contains four parts *Dhatri*, two parts *Lauha Bhasma* and one part *Yastimadhu*. *Bhavana* with *Amruta Kwatha* for seven times was given during preparing the *Vati*.

Criteria for selection of patients

Inclusion criteria

1. Patients with clinical signs and symptoms of *Pandu* (anemia) described in *Ayurvedic* classics and modern medicine
2. Patients of 2nd or 3rd trimester of pregnancy
3. Patients having Hb% equal to or less than 10 gm% but more than 6.5 gm%
4. Microcytic hypochromic appearance of red blood cell in peripheral smear.

Exclusion criteria

1. Patients suffering from pregnancy related complications such as pregnancy induced hypertension pregnancy induced hypertension (PIH), hyperemesis gravidarum, pre-eclampsia etc
2. 1st trimester of pregnancy
3. Patients having with high risk pregnancy
4. Patients having Hb% count less than 6.5 gm% and more than 10 gm%.

Criteria for assessment

1. Increase in Hb%
2. Improvement in signs and symptoms of the disease
3. Improvement in other biological parameters.

Ethical clearance

The study was cleared by the Institutional Ethics Committee. Prior to initiation of the study, written consent was taken from each patient. Patients were asked to withdraw their name from the study at any time without giving any reason if they wish.

Investigation

Hematological investigations like Hb (Hemoglobin) %, total red blood cell (TRBC), total leucocyte count (TLC), differential leucocyte count (DLC), platelet count, erythrocyte sedimentation rate (ESR), packed cell volume (PCV), mean cell volume (MCV), Mean corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC), peripheral smear, serum ferritin, serum iron, total iron binding capacity (TIBC) and routine and microscopic urine investigations were done.

Posology

Group A: Patients were given two tablets of *Pandughnivati* (500 mg) tds, before the meal with luke warm water for 90 days.

Group B: Patients were given one tablet of *Dhatrilauhavati* (500 mg) tds, before the meal with luke warm water for 90 days.

Statistical test

Based on observations, the data obtained were statistically analyzed in terms of mean, standard deviation, standard error and unpaired *t*-test was considered at the level of $P < 0.001$ as highly significant, $P < 0.05$ or $P < 0.01$ as significant and $P > 0.05$ as insignificant to assess the result.

Assessment for overall effect of therapy

- Complete remission: 100% relief in the signs and symptoms
- Marked Improvement: Above 76%
- Moderate Improvement: 51-75% relief in the signs and symptoms
- Mild improvement: 26-50% relief in the signs and symptoms
- Unchanged: Up to 25% relief.

Observations

In this clinical study, total 14 patients were registered in Group A, out of which 12 patients completed the treatment, whereas two patients discontinued. Out of 12 patients registered in Group B, 10 patients completed the treatment, whereas two patients discontinued.

In the present study, maximum number of patients, i.e., 46.15% belonged to age group of 23-27 years, 46.15% were between 13 and 16 weeks of gestation, 69.23% were multipara, 53.85% patients belonged to urban area, 100% were housewives, 65.38% were vegetarian, 88.46% patients were addicted of tea, 73.07% patients had *Vata-Pitta Prakriti* and 84.62% had *Mandagni*.

Results

Group A provided relief in all the cardinal features of *Garbhinipandu*. The result observed in *Shwasa* (dyspnea) (60%) and *Hridrava* (palpitation) (53.33%) were highly significant statistically ($P < 0.001$). *Daurbalya* (general weakness) (33.33%), *Shrama* (fatigue) (40%), *Aruchi* (anorexia) (28.57%) and *Pindikodvestana* (leg cramps) (55.55%) were decreased which were found statistically significant ($P < 0.05$) [Table 1]. No response was seen in objective parameters in this study [Table 2]. In Group B, results observed were highly significant statistically ($P < 0.001$) in *Panduta* (pallor) (50%) and *Shwasa* (dyspnea) (56.25%). The results in *Shrama* (fatigue) (61.54%), *Hridrava* (palpitation) (55.55%), *Aruchi* (anorexia) (42.85%), *Pindikodvestan* (leg cramps) (49.49%) were significant statistically (<0.05) [Table 3]. Hb%, TRBC, PCV

were slightly increased and TIBC was decreased in Group B whereas no result was found in other objective parameters [Table 4].

Total effect of therapy

On subjective parameters, in Group A, none of the patient had got complete remission, 8.33% of patients got marked improvement, and 33.33% patients got moderate improvement. 41.67% of patients had got mild improvement and 16.67% remained unchanged. In Group B none of the patients had got complete remission, 10% patients got marked improvement, 50% patients got moderate improvement, 30% patients had got mild improvement and 10% remained unchanged [Figure 1].

On objective parameters, in Group A, none of the patients had got complete remission, marked improvement and moderate improvement. Nearly 16.67% of patients had got mild

Table 1: Effect on cardinal features-Group A

N	Chief complaints	Mean score		% of relief	SD (±)	SE (±)	t	P
		BT	AT					
12	Pallor (<i>Panduta</i>)	2.08	1.58	24	1	0.29	1.73	>0.05
12	General weakness (<i>Daurbalya</i>)	2	1.33	33.33	0.88	0.25	2.60	<0.05
12	Fatigue (<i>Shrama</i>)	1.25	0.75	40	0.52	0.15	3.31	<0.05
11	Dyspnea (<i>Shwasa</i>)	1.36	0.54	60	0.40	0.12	6.71	<0.001
12	Palpitation (<i>Hridrava</i>)	1.25	0.58	53.33	0.49	0.14	4.7	<0.001
12	Anorexia (<i>Aruchi</i>)	1.75	1.25	28.57	0.52	0.15	3.31	<0.05
7	Leg cramps (<i>Pindikodvestana</i>)	1.28	0.57	55.55	0.48	0.18	3.87	<0.05

SD: Standard deviation, SE: Standard error, BT: Before treatment, AT: After treatment

Table 2: Effects on laboratory investigations-Group A

n	Laboratory investigation	Mean score		% of relief	SD (±)	SE (±)	t	P
		BT	AT					
12	Hb%	9.43	8.66	8.12	1.18	0.34	2.24	<0.05
12	TRBC	3.65	3.44	5.86	0.55	0.15	1.34	>0.05
12	PCV	29.40	27.15	7.65	3.44	0.99	2.26	<0.05
12	MCV	81.5	80.93	0.69	9.21	2.66	0.21	>0.05
12	MCH	26.37	25.97	1.51	3.31	0.95	0.41	>0.05
12	MCHC	32.25	31.99	0.82	1.06	0.30	0.87	>0.05
12	S. iron	34.50	32.36	-6.20	7.73	2.23	0.95	>0.05
12	S. ferritin	18.48	17.01	-7.97	19.96	5.76	0.25	>0.05
12	TIBC	397.75	363	4.41	92.51	26.70	0.62	>0.05

Hb: Hemoglobin, TRBC: Total red blood cell, MCV: Mean cell volume, PCV: Packed cell volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, S. iron: Serum iron, S. ferritin: Serum ferritin, TIBC: Total iron-binding capacity, SD: Standard deviation, SE: Standard error, BT: Before treatment, AT: After treatment

Table 3: Effect on cardinal features-Group B

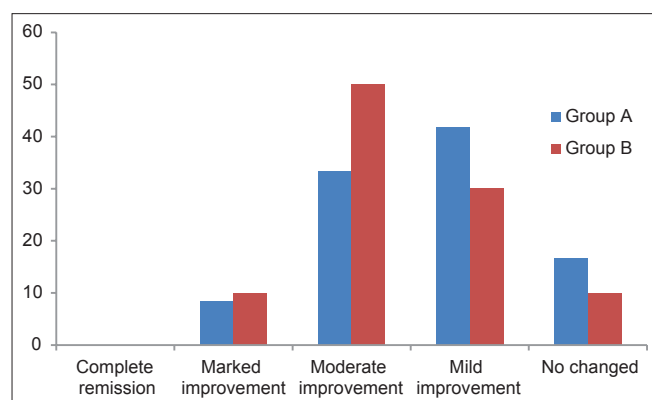
n	Chief complaints	Mean score		% of relief	SD (±)	SE (±)	t	P
		BT	AT					
10	Pallor (<i>Panduta</i>)	1.8	0.9	50	0.56	0.17	5.01	<0.001
10	General weakness (<i>Daurbalya</i>)	2	1.3	35	1.05	0.33	2.09	>0.05
10	Fatigue (<i>Shrama</i>)	1.3	0.5	61.54	0.63	0.2	4	<0.05
10	Dyspnea (<i>Shwasa</i>)	1.6	0.7	56.25	0.56	0.18	5.01	<0.001
9	Palpitation (<i>Hridrava</i>)	1	0.44	55.55	0.52	0.17	3.16	<0.05
10	Anorexia (<i>Aruchi</i>)	1.4	0.8	42.85	0.51	0.16	3.67	<0.05
7	Leg cramps (<i>Pindikodvestana</i>)	1.57	0.57	49.49	0.66	0.22	3.5	<0.05

SD: Standard deviation, SE: Standard error, BT: Before treatment, AT: After treatment

Table 4: Effects on laboratory investigations-Group B

n	Laboratory investigation	Mean score		% of relief	SD (±)	SE (±)	t	P
		BT	AT					
10	Hb %	9.08	9.13	-0.55	1.19	0.37	-0.13	>0.05
10	TRBC	3.53	3.85	-9.07	0.34	0.10	-2.92	<0.05
10	PCV	28.16	29.08	-0.92	3.84	1.21	-0.75	>0.05
10	MCV	80.3	75.72	5.70	4.30	1.36	3.36	<0.01
10	MCH	25.75	23.61	8.31	1.65	0.52	4.10	<0.01
10	MCHC	32.03	31.1	2.90	1.38	0.43	2.12	>0.05
10	S. iron	32.05	29.98	-6.46	6.47	2.04	1.01	>0.05
10	S. ferritin	25.12	20.62	-17.91	33.38	10.55	0.42	>0.05
10	TIBC	366.8	309.8	15.67	128.20	40.54	1.41	>0.05

Hb: Hemoglobin, TRBC: Total red blood cell, MCV: Mean cell volume, PCV: Packed cell volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, S. iron: Serum iron, S. ferritin: Serum ferritin, TIBC: total iron-binding capacity, SD: Standard deviation, SE: Standard error, BT: Before treatment, AT: After treatment

**Figure 1: Overall effect of therapy on subjective parameters**

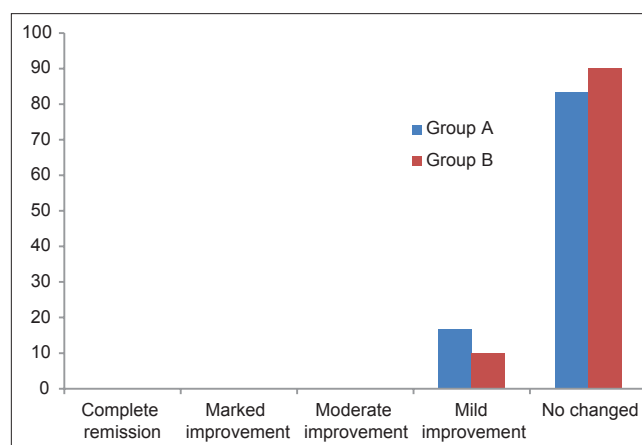
improvement and 83.33% patients remained unchanged. In Group B, Nearly 10% patients got mild improvement and 90% patients remained unchanged [Figure 2].

Discussion

Garbhinipandu (anemia in pregnancy) may be taken as a *Rasapradoshajayadhi* and it is a *Santarpanothavikara*, which is common in *Garbhavastha* (pregnancy). The consumable objects having excessive *Amla*, *Lavana*, *Katu* etc., *Rasa*, *Abhojana*, *Pramitabhojana* etc., is consumed abundantly by the pregnant women during pregnancy due to *Dauhrivadastha* and *Manasika Bhava* like *Chinta*, *Shoka*, *Krodha* etc., and other condition like multiple and repeated pregnancy were found as etiological factors for *Garbhini Pandu*.

In the present study, majority of patients (69.23%) were Multi Para. This observation indicates that repeated pregnancies and due to excessive blood loss they become Anemic. 65.38% patients were having a vegetarian diet. As iron supplied from Veg. diet is mainly non-Haem iron and its bioavailability is only about 1-10%.^[10] That is why vegetarians are more prone for iron deficiency anemia. Almost 84.62% had *Mandagni*. *Mandagni* creates *Ama* production and improper *Rasa Dhatu* formation, which is the foremost step in development of *Pandu*. 88.46% were habituated to tea. Tannins in tea can cause iron absorption to drop by 60%.

In Group A, result was observed statistically significant

**Figure 2: Overall effect of therapy on objective parameters**

improvement in a maximum of the cardinal features of *Garbhinipandu*. These results were observed due to efficacy of drugs of *Pandughnivati* such as *Raktavardhaka*, *Amapachana* and *Srotoshodhaka*. The decrease in Hb% can be due to the combined effect of increased demand and raised hemo-dilution which is physiological in pregnancy state. *Dhatrilauhavati* provided relief in all the cardinal features of *Garbhinipandu*. Hb%, TRBC, PCV were increased in percentage. *Dhatrilauhavati* contains *Lauha Bhasma*, which is iron supplementation and *Deepana* which leads to proper metabolism and *Dhatuposhana*. *Amalaki* and *Amruta* are *Rasayana* which leads to *Dhatuposhana* as well as supportive for the iron absorption. *Yastimadhu* has *Shonitasthapana* property. Thus, all cumulative effect leads to correction of metabolism, iron absorption, improved blood formation and correction of disease.

On comparing the effect of therapy on objective and subjective parameters of both groups there was not significant results. It means that both the therapies have more or less same effect and any one of them cannot be claimed as superior to other statistically. However, the better result was obtained in Group B than Group A. This may be attributed to the presence of *Lauha Bhasma* in *Dhatrilauhavati*.

Probable mode of action of *Pandughnivati* in *Pandu*
Pandughnivati contains *Trikatu*, which is *Deepana Pachana* and has *Srotoshodhaka* property, which leads to proper metabolism

and formation of proper *Dhatu*. *Amalaki*, which is a rich source of Vitamin C, is known enhancer of iron absorption. It also contains *Katuki* which is *Pitta Virechaka*, thus corrects *Pitta* and *Rakta*. *Punarnava* has *Srotoshodhaka* and *Raktavardhaka* properties. Thus, the cumulative effects of all the drugs lead to correction of metabolism, iron absorption, improved blood formation and correction of disease.

Probable mode of action of *Dhatrilauhavati* in *Pandu*

Dhatrilauhavati contains *Lauha Bhasma*, which is iron supplement and has *Deepana* property which leads to proper metabolism and *Dhatuposhana*. *Amalaki* and *Amruta* are *Rasayana* which lead to *Dhatuposhana* as well as are supportive for the iron absorption. *Yastimadhu* has *Shonitasthapana* property. Thus, cumulative effects of all the drugs lead to correction of metabolism, iron absorption, improved blood formation and correction of disease.

Conclusion

Garbhini Pandu may be correlated with iron deficiency anemia in pregnancy, which is commonly seen. In the present study on comparison a better percentage of improvement was noted in group B (*Dhatrilauhavati*) in terms of subjective and objective parameters than group A (*Pandughnivati*).

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हिन्दी सारांश

गर्भिणी पाण्डु में पाण्डुघनी एवं धात्रीलौहवटी का तुलनात्मक अध्ययन

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गर्भिणी स्त्री को प्रभावित करने वाली व्याधियों में पाण्डु प्रमुख है। आयुर्वेदिक ग्रन्थों में पाण्डु को रस प्रदोषज विकार के अन्तर्गत सम्मिलित किया गया है। गर्भावस्थाजन्य पाण्डु गर्भ के लिये अतिरिक्त आवश्यकता तथा रस धातु की अल्पता के फलस्वरूप होता है। प्रस्तुत अध्ययन में कुल २६ रुग्णाओं को पंजीकृत किया गया जिसमें से कुल २२ रुग्णाओं ने चिकित्सा अवधि पूर्ण की। प्रथम वर्ग में सम्मिलित १२ रुग्णाओं को पाण्डुघनी वटी, ५०० मि.ग्रा. की २ गोली दिन में तीन बार दी गई तथा द्वितीय वर्ग में सम्मिलित १० रुग्णाओं को धात्री लौह वटी ५०० मि. ग्रा. की १ गोली दिन में तीन बार दी गई। इस अध्ययन में प्रथम वर्ग की अपेक्षा द्वितीय वर्ग में उत्साहवर्धक परिणाम प्राप्त हुआ है।