

Role of an Ayurvedic Compound (*Panduhara Yoga*) in the management of Iron Deficiency Anaemia in Children

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ABSTRACT : Pandu Roga (Anaemia) is one of the common problem in the developing countries like India specially in women and children. Iron deficiency anaemia (IDA) is the commonest form of anaemia in children. Allopathic iron preparations are gastric irritant and having common side effects of oral iron including nausea, abdominal pain and either constipation or diarrhoea. To find out a satisfactory answer for the problem an Ayurvedic herbo-mineral compound (Mandura Bhasma one part + Amalaki Churna ten parts) was formulated and named as Panduhara Yoga. According to Ayurveda, Mandura Bhasma (ferrosoferic oxide) and Amalaki (*Emblica officinalis*) are very good drugs to prevent and manage the cases of Pandu Roga in children. Amalaki is Rasayana and it contains Vitamin-C that helps in the absorption of iron. Amalaki can increase bioavailability of Mandura Bhasma and can prevent the common hazards of oral iron therapy. A single blind clinical study was conducted in children of IDA. Panduhara Yoga has been administered in the dose of 110mg/kg body weight in two divided doses with honey after food for a period of 6 weeks. Hemoglobin level was improved with mean increase of 1.19gm/dl in three weeks (8.12 ± 1.56 g/dl to 9.31 ± 1.35 g/dl, $p < 0.001$), and 2.64gm/dl in six weeks (8.12 ± 1.56 g/dl to 10.76 ± 1.11 g/dl, $p < 0.001$). After 6 weeks treatment with Panduhara Yoga overall 93.33% children showed very good improvement on clinical features, whereas 50% children showed very good improvement on blood hemoglobin level. The results suggest that Panduhara Yoga is significantly effective in the management of iron deficiency anaemia in children. No adverse effect has been noticed during the therapy.

Key words : Panduhara Yoga, Iron Deficiency Anaemia, Haemoglobin.

INTRODUCTION

Anaemia is a clinico-pathogenic condition due to relative or absolute deficiency of Hb or RBCs or both, in relation to age and sex. Anaemia is one of the most prevalent disease. Iron deficiency is the most common cause of nutritional anaemia in the world. In developing countries it is nearly as common as protein energy malnutrition¹. Nutritional iron deficiency is the commonest cause of anaemia in India².

The regular response of iron deficiency anaemia to adequate amounts of iron is an important diagnostic and therapeutic feature. Oral administration of simple ferrous salts provides inexpensive and satisfactory therapy³. But all allopathic iron preparations are gastric irritant and common side effects of oral iron include nausea, abdominal pain and either constipation or diarrhoea. Ferrous sulphate usually causes severe gastrointestinal side effects like gastritis, constipation/ diarrhoea. Parenteral iron therapy may be required if iron can not be absorbed from intestine and patient experiences intolerable gut symptoms⁴.

To find out a satisfactory answer for the problem an Ayurvedic compound has been formulated and named

as Panduhara Yoga. Panduhara Yoga (Amalaki Powder + Mandura Bhasma) is an Ayurvedic herbo-mineral iron preparation for the management of anaemia. The Amalaki may increase bioavailability of Mandura Bhasma and can increase rate and amount of absorption of dietary iron and therapeutic iron compound. The Ayurvedic iron preparation due to its ingredients may prevent the common hazards of oral iron therapy like gastrointestinal upset, abdominal discomfort, constipation, iron intolerance etc. With these aim the research trial had been undertaken to know the efficacy of Panduhara Yoga in the management of iron deficiency anaemia.

Aim and Objectives :

1. To evaluate efficacy of Panduhara Yoga in Pandu Roga (iron deficiency anaemia) in children.
2. To give relief in clinical symptoms.
3. To restore normal haemoglobin percentage.
4. To provide scientific base and suitable effective and safe medicine for Pandu Roga (iron deficiency anaemia).

MATERIAL & METHODS

A single blind clinical study has been conducted in children suffering from iron deficiency anemia.

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Selection of cases :

For the study the patients of Pandu Roga (iron deficiency anaemia) were selected from the O.P.D. and I.P.D. of Bala Roga of National Institute of Ayurveda, Jaipur.

Inclusion Criteria :

- i) Patients ranging from age group 1 to 16 years of either sex.
- ii) Children with haemoglobin level less than 11 gm/dl.
- iii) Microcytic hypochromic anaemia on peripheral blood smears.

Exclusion Criteria :

Patients with blood Hb less than 6 gm/dl, Thalassemia, Lead poisoning, Sideroblastic anaemia, Anaemia due to malignancies, Congenital absence of iron binding protein, Hereditary spherocytosis, Sickle cell anaemia, Aplastic anaemia, Haemolytic anaemia, Any associated severe complication and having occult blood positive in stool examination were excluded.

Discontinuation Criteria :

- i) Blood haemoglobin level becomes less than 5 gm/dl during the course of treatment.
- ii) Any other acute illness.
- iii) Parents not willing to continue.
- iv) Any severe untoward effect.

Selection of Drug :

Panduhara Yoga (Amalaki Powder 10 part + Mandura Bhasma 1 part) was taken as trial drug for the study.

Procurement of the drug : The trial drug Panduhara Yoga was prepared by the pharmacy of the institute.

Schedule of treatment : The trial drug (Panduhara Yoga) in powder form was administered to the selected children in the dose of 110mg/kg body weight in two divided doses with equal amount of honey after food for the period of 6 weeks. Deworming of the cases was done before starting the therapy. Normal diet was advised to all the cases according to age.

Follow-up was done after 3weeks and 6weeks of treatment.

Laboratory investigations :

- i) Blood for total RBCs, WBCs count, DLC, Hb gm%, ESR, MCV, MCH, MCHC, Peripheral Blood Smear (PBS)

- ii) Urine routine and microscopic examination.
- iii) Stool routine and microscopic examination.

Above investigations of the patients were done in the pathology and biochemistry department of National Institute of Ayurveda, Jaipur.

Assessment Criteria :

The results of the clinical study were assessed on the basis of observations of clinical features and laboratory findings. Following parameters were adopted for assessing the response of the treatment.

i] Clinical Assessment :

Following clinical findings were assessed before, during and after treatment-

- 1) Vivarnata (Pallor),
- 2) Daurbalya (weakness),
- 3) Shrama (fatigue),
- 4) Aruchi (anorexia),
- 5) Kopana or Adhirata (irritability),
- 6) Shwasa (dyspnoea),
- 7) Hridayaspandana (Palpitation),
- 8) Shotha(oedema),
- 9) Habit of pica.

ii] Laboratory Assessment :

Following laboratory findings has been assessed before, during and after treatment-

- 1) Total RBC count,
- 2) Blood hemoglobin level,
- 3) MCV,
- 4) MCH,
- 5) MCHC,
- 6) Peripheral Blood Smear.

Description of Grades and its relation with grade points : For the purpose of statistical assessment of results some grades, grade points considering the severity of different clinical features and laboratory findings have been used as follows-

Severity	Grade	Grade Points
Severe	G3	3
Moderate	G2	2
Mild	G1	1
Normal	G0	0

Assessment Scale :**A) Vivarnata (pallor or paleness) :**

- G0- No paleness
- G1- Mild paleness in conjunctiva
- G2- Paleness in conjunctiva, tongue and nails
- G3- Marked paleness on patient's face and palmer crease

B) Daurbalya (weakness) :

- G0- No weakness
- G1- Weakness on heavy work or excessive play
- G2- Weakness on routine work on normal play
- G3- Weakness even on rest

C) Shrama (fatigue) :

- G0- No fatigue or fatigue only after excessive work or play
- G1- Fatigue on doing less than accustomed work or play
- G2- Fatigue on doing routine work or after normal play
- G3- Fatigue even on rest or no activity

D) Aruchi (anorexia) :

- G0- Nomal appetite
- G1- Unwilling to take food, but eats
- G2- Unwilling to take food, intake of food decreases
- G3- No interest to take food

E) Kopana or Adhirata (irritability) :

- G0- Not irritable
- G1- Irritable but not always
- G2- Irritable most of the time
- G3- Persistent irritability

F) Shwasa (dyspnoea) :

- G0- No dyspnoea or dyspnoea on more than accustomed work/play
- G1- Dyspnoea on accustomed work/play
- G2- Dyspnoea while doing less than accustomed work/play
- G3- Dyspnoea on rest

G) Hridayaspandana (palpitation) :

- G0- No palpitation
- G1- Palpitation on excessive playing/exercise

G2- Palpitation on slight exercise

G3- Palpitation on rest

H) Shotha (oedema) :

- G0- No oedema
- G1- Swelling in one particular region like in the face (around eyeball), or pedal oedema etc.
- G2- Oedema in the two or more different sites
- G3- Generalised oedema

I) Blood hemoglobin level :

- G0- Hemoglobin level > 11gm/dl
- G1- Hemoglobin level 9.5 gm/dl to < 11gm/dl
- G2- Hemoglobin level 7.5 gm/dl to < 9.5gm/dl
- G3- Hemoglobin level 6 gm/dl to < 7.5gm/dl

Assessment of Result :

The results were assessed on the basis of observations of clinical features and laboratory findings before, during and after treatment.

Very Good : Improvement 75% and above

Good : Improvement 50% and above but <75%

Fair : Improvement 25% and above but <50%

Poor : No improvement or marginal improvement <25%

Adverse Effect Evaluation criteria :

To rule out the possible adverse effect of studied drug clinical criteria was adopted and documented in AEEF (Adverse effect Evaluation Format) during the course of the study in every 2 weeks follow up.

OBSERVATION & RESULTS

Total 39 patients were registered, out of which 30 patients had completed the treatment course while 9 patients dropped out due to irregular follow up. The observations and result of the present study is being presented in table no. 1 to table no. 9.

Age & Sex wise : It was found that the highest number of patients i.e. 60% were between 1 to 5 years. The highest number of patients i.e. 60% were male children.

TABLE NO. 1 : INCIDENCE OF THE DISEASE ACCORDING TO AGE AND SEX (N=30) :

Age Group (in years)	Male Children		Female Children		Total	%
	f	%	f	%		
>1 to 5	12	40%	06	20%	18	60%
>5 to 9	01	3.33%	03	10%	04	13.33%
>9 to 13	03	10%	03	10%	06	20%
>13 to 16	02	6.67%	0	0%	02	6.67%
Total	18	60%	12	40%	30	100%

F: frequency/no. of patients, %: Percentage

TABLE NO. 2 : BLOOD HEMOGLOBIN LEVEL OF THE PATIENTS AT REGISTRATION AND SUBSEQUENT FOLLOW UPS (N=30) :

		Initial	FU (3wks)	FU (6wks)
Blood hemoglobin level (in gm%)	G-3	11(36.67%)	2 (6.67%)	0 (0%)
	G-2	11(36.37%)	15 (50%)	5 (16.66%)
	G-1	8 (26.66%)	8 (26.67%)	10 (33.33%)
	G-0	0 (0%)	5 (16.66%)	15 (50%)

TABLE NO. 3 : INCREASE OF BLOOD HB LEVEL IN THE PATIENTS OF IDA AFTER TREATMENT WITH PANDUHARA YOGA (N=30) :

Net Increase of Hb Level	FU (3wks)		FU (6wks)	
	No. of Patients	%	No. of Patients	%
≤1gm/dl	13	43.33%	1	3.33%
>1 to ≤2 gm/dl	14	46.67%	8	26.67%
>2≤3 gm/dl	3	10.00%	11	36.67%
>3≤4 gm/dl	0	0.00%	7	23.33%
>4 gm/dl	0	0%	3	10.00%

TABLE NO. 4 : INCIDENCE OF PICA OF THE PATIENTS OF IDA BEFORE AND AFTER TREATMENT (N=30) :

Habit of pica	Initial		FU (3wks)		FU (6wks)	
	f	%	f	%	f	%
Present	07	23.33%	02	6.67%	0	0%
Absent	23	76.67%	23	76.66%	28	93.33%
Reduced	-	-	05	16.67%	02	6.67%

TABLE NO. 5 : MICROCYTIC & HYPOCHROMIC ANAEMIA ON PERIPHERAL BLOOD SMEAR OF THE PATIENTS OF IDA BEFORE AND AFTER TREATMENT :

Microcytic & Hypochromic Anaemia	Initial		FU (3wks)		FU (6wks)	
	f	%	f	%	f	%
Observed	30	100%	20	66.67%	07	23.33%
Not observed	0	0%	10	33.33%	23	76.67%

TABLE NO. 6 : CLINICAL RECOVERY IN PATIENTS OF IDA TREATED WITH PANDUHARA YOGA :

Sl. No.	Parameters	Treatment	Mean±S.D.	Improve ment %	SE	d.f. (n-1)	t value	p value
1	Vivarnata (pallor)	BT	2.00±0.74					
		FU (3wks)	0.93±0.78	53.33%	0.05	29	23.03	<.001
		FU (6wks)	0.37±0.49	81.67%	0.09	29	18.25	<.001
2	Daurbalya (weakness)	BT	1.81±0.74					
		FU (3wks)	0.85±0.66	53.06%	0.06	26	14.82	<.001
		FU (6wks)	0.15±0.36	91.84%	0.11	26	15.61	<.001
3	Shrama (fatigue)	BT	1.71±0.78					
		FU (3wks)	0.71±0.78	58.33%	0.10	20	10.25	<.001
		FU (6wks)	0.24±0.44	86.11%	0.13	20	11.24	<.001
4	Aruchi (anorexia)	BT	1.88±0.53					
		FU (3wks)	0.60±0.65	68.09%	0.09	24	13.97	<.001
		FU (6wks)	0.04±0.20	97.87%	0.09	24	19.47	<.001
5	Kopana or Adhirata (irritability)	BT	1.27±0.46					
		FU (3wks)	0.41±0.50	67.86%	0.07	21	11.53	<.001
		FU (6wks)	0.05±0.21	96.43%	0.09	21	13.42	<.001
6	Shwasa (dyspnoea)	BT	1.30±0.48					
		FU (3wks)	0.60±0.52	53.85%	0.15	9	4.58	<.01
		FU (6wks)	0.20±0.42	84.62%	0.18	9	6.13	<.001

Contd....

7	Hridayaspandana (palpitation)	BT	1.50±0.65					
		FU (3wks)	0.71±0.73	52.38%	0.15	13	5.08	<.001
		FU (6wks)	0.21±0.43	85.71%	0.19	13	6.62	<.001
8	Shotha (oedema)	BT	1.10±0.32					
		FU (3wks)	0.40±0.52	64%	0	9	5	<.001
		FU (6wks)	0.10±0.32	90.91%	0.15	9	6.71	<.001

TABLE NO. 7 : PATTERN OF HEMATOLOGICAL CHANGES IN PATIENTS OF IDA TREATED WITH PANDUHARA YOGA :

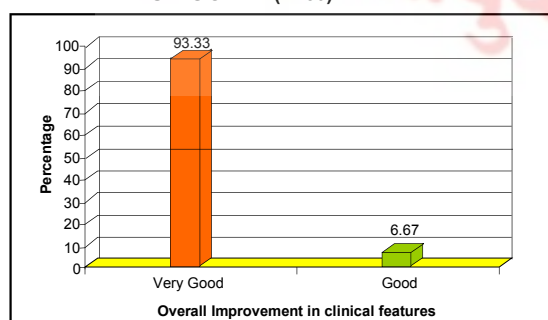
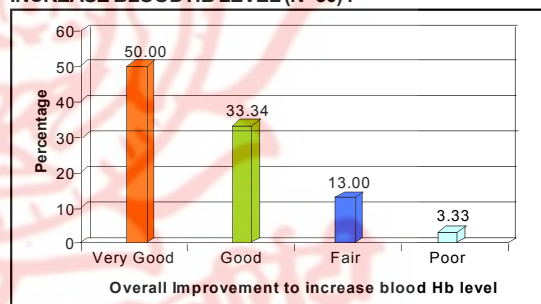
Sl. No.	Parameters	Treatment	Mean±S.D.	Improve ment %	SE	d.f. (n-1)	t value	p value
1	Hemoglobin Level (gm/dl)	BT	8.12±1.56					
		FU (3wks)	9.31±1.35	14.74%	0.11	29	11.26	<.001
		FU (6wks)	10.76±1.11	32.53%	0.18	29	14.66	<.001
2	Total RBC Count (mill/µl)	BT	3.94±0.49					
		FU (3wks)	4.37±0.40	10.88%	0.04	29	9.80	<.001
		FU (6wks)	4.78±0.46	21.35%	0.07	29	11.62	<.001
3	MCV (fl)	BT	67.72±7.59					
		FU (3wks)	73.68±7.50	8.80%	0.96	29	6.18	<.001
		FU (6wks)	78.69±9.14	16.20%	1.34	29	8.21	<.001
4	MCH (pg)	BT	21.90±3.70					
		FU (3wks)	23.92±3.25	9.26%	0.32	29	6.41	<.001
		FU (6wks)	26.27±3.28	19.96%	0.49	29	8.96	<.001
5	MCHC (gm/dl)	BT	30.17±3.10					
		FU (3wks)	32.18±2.94	6.66%	0.23	29	8.67	<.001
		FU (6wks)	34.29±2.83	13.67%	0.36	29	11.40	<.001

TABLE NO. 8 : OVERALL EFFECT OF PANDUHARA YOGA IN CLINICAL FEATURES OF IDA (N=30) :

Overall Effect	No. of cases	%
Very Good	28	93.33%
Good	02	6.67%

TABLE NO. 9 : OVERALL EFFECT OF PANDUHARA YOGA TO INCREASE BLOOD HB LEVEL (N=30) :

Overall Effect	No. of cases	%
Very Good	15	50.00%
Good	10	33.34%
Fair	4	13.00%
Poor	1	3.33%

FIGURE-1 : OVERALL EFFECT OF PANDUHARA YOGA IN CLINICAL FEATURES OF IDA (N=30) :**FIGURE-2 : OVERALL EFFECT OF PANDUHARA YOGA TO INCREASE BLOOD HB LEVEL (N=30) :**

In the present clinical study 50% patients were from urban slum area and 53.33% of patients of IDA were belonging to poor economical status. The 63.33% of patients were non-vegetarian. The 17 (56.67%) children of IDA were under weight. *Pitta-Kapha Prakriti* was observed in the maximum 12 (40%) number of patients, followed by *Vata-Pittaja Prakriti* (36.67%).

DISCUSSION

From the table no.3, 6 & 7, it is evident that the treatment of iron deficiency anemia with Panduhara Yoga shows significant reduction of clinical features and statistically significant increase of hematological values like blood Hb%, total RBC, MCV, MCH, MCHC etc.

Blood Hemoglobin level was improved significantly with mean increase of 1.19gm/dl in three weeks (8.12±1.56g/dl to 9.31±1.35g/dl, p<0.001), and 2.64gm/dl in six weeks (8.12±1.56g/dl to 10.76±1.11g/dl, p<0.001). Table no. 4 and 5 show that Panduhara Yoga is effective for the correction of microcytic & hypo-chromic anaemia and eating disorder pica. After 6 weeks treatment with Panduhara Yoga. Overall 93.33% children showed very good improvement in clinical features in the patients of IDA. 50% children showed very good improvement in increasing blood hemoglobin level.

Probable mode of action of the trial drug :

Mandura bhasma is a natural source of iron and is best for children. It is *Sheeta* in *Guna* and *Virya* and *Param Raktavridhikar* (best haematinic) in *karma*⁵. Amalaki (*Emblca officinalis*) is richest source of Vitamin C which helps in absorption of iron. It is useful as general tonic, laxative, liver tonic, stomachic, restorative, alterative, digestive⁶. Amalaki may increase the bioavailability of Mandura Bhasma and helps in the formation of haemoglobin. Presence of the herbal ingredient Amalaki in the herbomineral medicine Panduhara Yoga may decrease the common hazards of oral iron therapy.

Adverse Effect Evaluation of Panduhara Yoga :

All the patients were examined bi-weekly for evaluation of any adverse drug reaction. It was found

that the drug 'Panduhara Yoga' had no noticeable side effect. The drug was tolerated well and not a single patient exhibited any of the symptoms.

CONCLUSION

Iron deficiency anaemia (IDA) is one of the common problems in children. Panduhara Yoga has been subjected to a clinical trial on thirty patients suffering from IDA. From the present clinical study it is evident that the herbo-mineral compound Panduhara Yoga is an effective, well tolerated and clinically safe formulation for the management of IDA.

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हिन्दी सारांश

बाल्यावस्था के लौह तत्वहीनता जन्य पाण्डु में आयुर्वेदिक औषध (पाण्डुहर योग) का प्रभावात्मक अध्ययन

आशिषकुमार गराई, मोती राय एवं अभिमन्यु कुमार

भारत जैसे विकासशील देश में पाण्डु एक आम समस्या है जो कि बच्चों तथा महिलाओं में बहुतायत में मिलती है। पाण्डु में विशेषकर लौह तत्व की कमी देखी जाती है जिसको दूर करने के लिए पाश्चात्य चिकित्सा पद्धति में जो लौह तत्वयुक्त औषधियां प्रयुक्त होती हैं वह सभी पाचन तंत्र संबंधी अनेक समस्याएं जैसे जी मिचलाना, उदरशूल, मलबद्धता इत्यादि को उत्पन्न करती हैं। उपरोक्त समस्या के समाधान हेतु एक वानस्पतिक-खनिज योग पाण्डुहर योग (मण्डूर भस्म 1 भाग + आमलकी 10 भाग) का निर्माण कर उसकी कार्मुकता का अध्ययन किया गया। आमलकी बाल्यावस्था जन्य पाण्डु में अत्यंत प्रभावकारी है। यह मण्डूर भस्म की जैविक क्षमता को बढ़ाकर उसके आंत्रिक अवशोषण में सहायता करती है। साथ ही पाश्चात्य चिकित्सा शास्त्र के सादृश्य अन्य हानिकारक प्रभावों को उत्पन्न नहीं होने देती है। उपर्युक्त औषध (पाण्डुहर योग) का बाल्यावस्था जन्य पाण्डु पर सिंगल ब्लाडपंड चिकित्सात्मक अध्ययन किया गया। पाण्डुहर योग को 110mg/kg शरीर भारानुसार प्रातः सायं दो भाग में 6 सप्ताह तक सेवन कराया गया। हिमोग्लोबिन मात्रा में 3 सप्ताह में माध्य वृद्धि 1.19g/dl (8.12±1.56 g/dl to 9.31±1.35g/dl, p<0.001) एवं 6 सप्ताह में माध्य वृद्धि 2.64g/dl (8.12±1.56 g/dl to 10.76±1.11g/dl, p<0.001) देखी गयी। पाण्डुहर योग के 6 सप्ताह तक लगातार सेवन से 99.33% बच्चों में सर्वोत्तम और 6.67% बच्चों में पाण्डु के सामान्य लक्षणों में उत्तम सुधार परिलक्षित हुआ। साथ ही हीमोग्लोबिन मात्रा में 50% बच्चों में सर्वोत्तम तथा 33.33% में उत्तम लाभ देखा गया। उपर्युक्त शोध बाल्यावस्था जन्य पाण्डु में पाण्डुहर योग के चिकित्सात्मक प्रभाव को दर्शाता है। इसके प्रयोग में कोई भी दुष्प्रभाव नहीं देखा गया।

