

Research Article

A Comparative Study of Bibhitakadi Vatak and Dhatri Lauha in the Management of Pandu Roga W.S.R. to Iron Deficiency Anaemia in Children

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Abstract

Among nutritional disorders, Iron Deficiency Anaemia (IDA) is one of the most common diseases in all age groups especially in children and teenagers. Anaemia is well defined from Vedic period as Pandu Roga. It defines as Pitta dominant Tridoshaja disease of Rasavaha Strotas, where the colour of skin becomes pallor (Vaivarna). Ayurvedic system of medicine suggests many herbo mineral drugs which are effective in treatment of Pandu Roga without untoward effects. This clinical study was designed to evaluate the efficacy of Bibhitakadi Vatak and Dhatri Lauha in management of Pandu Roga as well as to compare the efficacy of Bibhitakadi vatak and Dhatri Lauha in management of Pandu Roga. This research study was conducted in the form of double-blind randomized trial. Total 57 patients were registered for the clinical trial and randomly divided in two groups, 27 patients in Group A and 30 patients in Group B. The 20-20 patients were completed the treatment in both groups. In Group A (n=20) Compound A-1 syrup and in Group B (n=20) Compound A-2 syrup in a dose of 1 ml/kg/day twice a day were administered for 60 days. Assessment of the patients was done on subjective and objective parameters. The results were statistically analyzed. In intergroup study P-Value for almost parameters was greater than 0.05. Hence it was concluded that there was no significant difference between Group A and Group B. It means that both the drugs have more or less same effect and cannot be claimed as superior to other statistically. On comparing the effect of therapy in this study, consistently better percentage improvement in most of subjective and objective parameters was observed in Group A. Both drugs Dhatri Lauha and Bibhitakadi Vatak were found safe and effective in the management of Pandu (Iron deficiency anemia).

Keywords: Anaemia; Pandu roga; Dhatri lauha; Bibhitakadi vatak

Introduction

Anaemia is well defined from Vedic period as Pandu Roga. It defined as Pitta dominant Tridoshaja disease of Rasavaha Strotas, where the colour of skin becomes pallor (Vaivarna). The main diagnostic feature of Pandu Roga is Panduta (pallor) develop from the depletion of Rasa Dhatu which in turn becomes ineffective in production of Rakta Dhatu, gives rise to the symptoms like depletion of blood, fatigue, body ache, palpitation, periorbital oedema, anorexia, dyspnoea and fainting [1]. Acharya Kashyapa has specifically described symptoms of Pandu such as Panduta (pallor), Akshikootashoth (swelling around eyes), Avipaka, and Shrama in infant and children [2]. Nidana, Samprapti, Lakshana and types of Pandu Roga-Vataja Pandu, Pittaja Pandu, Kaphaja Pandu, Tridoshaja Pandu and Mriddhakshanjanya are explained in Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Madhava Nidaan and Bhava Prakash. Both Shodhana and Shamana therapy are used to alleviate Pandu Roga. Pitta-Shamaka,

Deepana-Pachana, Rasayana, Srotoshodhaka, Raktavardhaka, Agni-Vardhaka, Immunomodulatory and hepato-protective drugs should be used to manage Pandu Roga. Though direct correlation of an Ayurvedic disease with a specific disease mentioned in modern literature is difficult, Pandu has been equated with anemia based on a comparison of Pandu Roga symptoms with symptoms of anemia as stated in respective texts. The most common cause of anemia in children is iron deficiency. For the purpose of this study, Pandu Roga was taken from Iron Deficiency Anaemia.

IEC Redg no-This study was approved by IEC via letter no. DSRRAU/UCA/IEC/19-20/208 on dated 13.01.2020.

Study Design

- Study type: Interventional
- Blinding: Double Blind
- Interventional Groups: Two groups
- Randomization: Simple Random Sampling
- Masking: opaque envelop
- Purpose: Treatment
- Timing: 60 days
- End point: Efficacy

Materials and Methods

Total 57 patients of both sexes of age group 1-16 year were randomly selected from OPD and IPD of Hospital of University Postgraduate Institute of Ayurved Studies and Research, Dr. SR Rajasthan Ayurved University, Jodhpur, Rajasthan.

Citation: Seema, Singhal HK, Vyas PP, Rai DK. A Comparative Study of Bibhitakadi Vatak and Dhatri Lauha in the Management of Pandu Roga W.S.R. to Iron Deficiency Anaemia in Children. Ann Clin Case Stud. 2022; 4(4): 1061.

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Publisher Name: Medtext Publications LLC

Manuscript compiled: Oct 10th, 2022

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Inclusion criteria

- 1 to 16 years age groups of both sexes' patients were included in study.
- Patient having Hb% ranging from 7 gm% to 10 gm%.
- Patient showed Cardinal Feature of anemia was selected for study.

Exclusion criteria

- Patients below 1 year of age group and patients above 16 year of age group.
- Patients suffering from hereditary conditions like Thalassemia, Aplastic Anemia, Sickle cell anemia etc were excluded from study.
- Patient having Hb% less than 7 grams % were excluded from study.

Discontinue criteria

- Parents/Guardian/Children not willing to continue treatment.
- Patient develops any life-threatening complication during treatment.
- Any other acute illness.

Grouping and posology

The patients were selected randomly divided in two groups, namely Group-A and Group-B and examined clinically along with laboratory investigation (Table1).

Selection of drugs

Many preparations have been mentioned in the Ayurvedic literature for the treatment of Pandu Roga. Bibhitakadi Vatak and Dhatri Lauha, which described in Sushruta Samhita and Bhaishjaya Ratnavali respectively, have been selected for this present research study. To enhance its palatability for easy administration in children both formulations has been prepared in the form of syrup.

Preparation of drug

Both drugs were prepared in pharmacy of University Postgraduate Institute of Ayurved Studies and Research, Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University Jodhpur (Table 2).

Procedure: Bibhitaki, Shunthi and Tila were taken in equal quantity and mixed well. After mixing made them Yavakuta form. Decoction of all drugs made in 8 times of water and continued till ¼ parts. 70% guda and 0.3% preservative (sodium benzoate) of decoction were mixed after filtering. Mandura Bhasma was added later on. Quantity of Mandura Bhasma was calculated by young's formula from adult dose of Mandura Bhasma which is given in AFI. After complete cooling syrup, was packed in 200 ml bottles with the help of bottle feeling machine (Table 3).

Procedure: Amalaki, Pippali, Shunthi, Marich, and Haridra were taken in equal quantity and mixed well. After mixing made them Yavakuta form. Decoction of all drugs made in 8 times of water and continued till 1/4 parts remains. 70% sugar and 0.3% preservative (sodium benzoate) of decoction were mixed after filtering. Later on, Lauha Bhasma was added. Quantity of Lauha Bhasma was calculated by young's formula from adult dose of Lauha Bhasma which is given in AFI. After complete cooling, syrup was packed in 200ml bottles with the help of bottle feeling machine.

Table 1: Showing grouping & Posology.

Group	A	B
Name of Drug	(Compound-A-1 Syrup)	(Compound-A-2 Syrup)
Number of Patients	20	20
Type of Study	Double Blind	Double Blind
Duration of Drug Trial	60 Days	60 Days
Dose	1ml/kg/day	1ml/kg/day
Duration	2 times/day in two divided doses	2 times/day in two divided doses
Route	Oral	Oral
Randomization	Simple random sampling	Simple random sampling

Table 2: Showing contents of Bibhitakadi Vatak Syrup (Compound-A-1 Syrup).

S.No.	Ingredient	Latin Name	Ratio
1.	Bibhitaki	Terminalia Bellirica	1 Part
2.	Sunthi	Zingiber Officinale Rosc	1 Part
3.	Tila	Sesamum indicumLinn	1 Part
4.	Mandoor Bhasma		As Per AFI
5.	Guda		QNS

Table 3: Showing contents of Dhatri Lauha (Compound-A-2 Syrup).

S.No.	Ingredient	Latin Name	Ratio
1.	Dhatri	Embelica officinalis Gaertn.	1 Part
2.	Marich	Piper nigrum Linn.	1 Part
3.	Pippali	Piper longum Linn.	1 Part
4.	Haridra	Curcuma longa Linn	1 Part
5.	Sunthi	Zingiber Officinale Rosc	1 Part
6.	Lauha Bhasma	-	As per AFI
7.	Sugar		QNS

The prepared syrup was packed in sterile bottles of 200 ml capacity and labelled with batch no. and drug licence number by the pharmacy. Both drugs were of similar physical character and repacked in same packing. Coding of study drugs were done by another person not related to this study. Coded document was kept under safety and the envelope was opened after the completion of study to decode the compounds.

Assessment criteria

During the trial patients were assessed on the basis of Subjective Parameters and Objective Parameters.

Subjective criteria (Table 4)

Objective criteria

Following investigations were assessed before and after treatment.

- Haemoglobin
- Total Red Blood Corpuscles
- Packed Cell Volume
- Mean Cell Volume
- Mean Corpuscular Haemoglobin
- Mean Corpuscular Haemoglobin Concentration
- Erythrocyte Sedimentation Rate
- Serum Iron
- TIBC
- Serum Ferritin

Overall assessment of result

1. Complete improvement- 100% improvement in both objective and subjective parameters.

Table 4: Depicting Grading/Scoring Pattern.

S.no.	Feature	Grading/Scoring
1	Vaivarnya (Pallor) No pallor	G0/0
	Pallor of Conjunctiva	G1/1
	Pallor of Conjunctiva, Nails, Tongue, Skin	G2/2
2	Pallor of Conjunctiva, Nails, Tongue, Skin, Palms and Soles	G3/3
	Aruchi (Anorexia) Normal Appetite	G0/0
	No willing to take food, but eats	G1/1
3	Intake of food decreases	G1/2
	No interest to take food	G3/3
	Daurbalya (Weakness) No feeling of weakness	G0/0
4	Weakness at the time of heavy work	G1/1
	Weakness on daily routine work	G2/2
	Weakness even on rest	G3/3
5	Bhrama (Giddiness) No giddiness	G0/0
	Occasionally present	G1/1
	Present most of the time	G2/2
6	Persistence	G3/3
	Hridspandana (Palpitation) No palpitation	G0/0
	Palpitation on heavy exertion	G1/1
7	Palpitation on moderate exertion	G2/2
	Palpitation on mild exertion	G3/3
	Swasa (Dyspnoea) No dyspnoea	G0/0
8	Dyspnoea after heavy work but tolerable	G1/1
	Dyspnoea after mild work but tolerable	G2/2
	Dyspnoea after light work and intolerable	G3/3
9	Pindikodvestana (Leg cramps) No leg cramps	G0/0
	Leg cramps present only in night	G1/1
	Leg cramps present most of time	G2/2
10	Leg cramps always present	G3/3
	Agnisada (Indigestion) Normal digestion	G0/0
	Mild indigestion	G1/1
11	Moderate indigestion	G2/2
	Severe indigestion	G3/3
	Karnakshveda (Tinnitus) No tinnitus	G0/0
12	Sometime present	G1/1
	Most of the time present	G2/2
	Always present	G3/3
13	Akshikuta shoth (Periorbital oedema) No oedema	G0/0
	Oedema present occasionally	G1/1
	Oedema present in morning hours	G2/2
14	Always present	G3/3
	Shrama (Fatigue) No fatigue	G0/0
	Fatigue at the time of moderate work or exercise	G1/1
15	Fatigue after light work	G2/2
	Fatigue after routine work	G3/3
	Gaurava (Feeling of heaviness) No feeling of heaviness	G0/0
16	Occasionally present	G1/1
	Most of the time present	G2/2
	Always present	G3/3
17	Gatra shula (Body ache) No body ache	G0/0
	Present on excessive work or exercise	G1/1
	Present on mild work or exercise	G2/2
18	Present even on rest	G3/3
	Kopan (Irritability) No irritation	G0/0
	Occasional irritation	G1/1
19	Most of time irritation	G2/2
	Persistent irritability	G3/3

2. Marked improvement- 76%-99% improvement in both objective and subjective parameters.
3. Moderately improvement 51%-75% improvement in both objective and subjective parameters.
4. Mild improvement- 26%-50% improvement in both objective and subjective parameters.

5. Unchanged -Below 25% improvement in both objective and subjective parameters.

Statistical analysis

- Intra Group study- For Nonparametric Data Wilcoxon matched-pairs signed rank test while for Parametric Data Paired 't' Test was used.
- Inter group study- Mann-Whitney Test is used for Nonparametric Data and Unpaired 't' Test was used while for Parametric Data.
- The results were calculated based on the following P Value - Not Significant : $P > 0.05$; Significant : $P < 0.05$; Very significant: $P < 0.01$; Extremely significant: $P < 0.001$

Observations

In the present study, maximum number of patients, i.e. Maximum 23 (57.5%) patients were male, maximum (50%) patients belongs to age group 6-10 years, maximum 92.5% were Hindu, maximum (42.5%) patients belongs to Middle class, Personal hygiene observed in maximum patients was moderate (52.50 %), maximum patients (72.5%) were having vegetarian diet, maximum patients were belonged to rural area (65%), maximum (55%) patients were having Pitta Kapha Prakriti, maximum 67.5% patients were having Raja Tama Prakriti, Sara observed in maximum (57.5%) patients was Madhyam, Samhanana was observed as Madhyama in maximum (65%) patients, Pramana was observed as Madhyama in maximum (60%) patients, Satmya was observed Madhyama in maximum patients 57.50%, maximum (65%) patients was Madhyam, Abhyavarana Shakti was observed Madhyam in maximum patients (55%), Jarana Shakti was observed Madhyam in maximum (55%), Vyayama Shakti was observed Madhyam in maximum (55%) patients, all patients was belonged to Jangaladesha, Agni observed was Manda in maximum (77.5%) patients, Appetite was poor in maximum (70%) patients, Koshtha was Madhya in maximum (65%) patients, maximum (52.50%) patients had disturbed sleep, addiction was not observed in 65% patients.

Results

Effect of therapy on subjective parameters in Group A and Group B

Group A and Group B provided extremely significant ($P < 0.001$) result in Vaivarnaya, Aruchi, Daurbalya, Shrama, Hridspandana, Pindikodweshtana, Agnisada, Gaurava, Gatra Shula, Kopan, very significant ($P < 0.01$) result in Bhrama, Shwasa, whereas relief in Akshikuta Shotha, karnakshveda was statistically significant ($P < 0.05$) (Table 5).

Effect of therapy on objective parameters in Group A and Group B

Group A and Group B provided improvement on all objective parameters of Pandu. Increase in all parameters was extremely significant ($P < 0.001$) (Table 6).

Intergroup comparison between Group A and Group B on subjective parameter

P-Value for almost parameters was greater than 0.05. Hence it was concluded that, there was no significant difference between Group A and Group B (Table 7).

Intergroup comparison between Group A and Group B on objective parameter

Table 5: Depicting Effect of therapy on Subjective parameters in Group A and Group B.

Variable	Group	Mean		SD	SE	Mean Diff.	% Relief	P-Value	R
		BT	AT						
Vaivarnya (Pallor)	A	1.9	0.3	0.6	0.13	1.6	84.21	<0.001	ES
	B	1.85	0.35	0.61	0.14	1.5	81.08	<0.001	ES
Aruchi (Anorexia)	A	1.85	0.3	0.6	0.14	1.55	83.78	<0.001	ES
	B	2.05	0.5	0.51	0.11	1.55	75.61	<0.001	ES
Daurbalya (Weakness)	A	1.8	0.3	0.51	0.11	1.5	83.33	<0.001	ES
	B	2	0.55	0.51	0.11	1.45	72.5	<0.001	ES
Bhrama (Giddiness)	A	0.9	0.25	0.67	0.15	0.65	72.22	0.002	VS
	B	0.65	0.3	0.49	0.11	0.35	53.85	0.002	VS
Hridspand-ana (Palpitation)	A	1.4	0.45	0.6	0.14	0.95	67.86	<0.001	ES
	B	0.95	0.4	0.6	0.14	0.55	57.89	<0.001	ES
Shwasa (Dyspnoea)	A	1.15	0.15	0.97	0.22	1	86.96	0.002	VS
	B	0.95	0.35	0.6	0.13	0.6	63.16	0.002	VS
Pindikodve-stana (Leg Cramps)	A	1.4	0.25	0.59	0.13	1.15	82.14	<0.001	ES
	B	1.4	0.3	0.55	0.12	1.1	78.57	<0.001	ES
Agniasada (Indigestion)	A	1.95	0.45	0.51	0.11	1.5	76.92	<0.001	ES
	B	1.65	0.45	0.52	0.12	1.2	72.73	<0.001	ES
Karnakshv-eda (Tinnitus)	A	0.35	0.1	0.44	0.1	0.25	71.43	0.025	Sig
	B	0.35	0.15	0.41	0.09	0.2	57.14	0.025	Sig
AkshikutaShoth (Periorbital Oedema)	A	0.3	0.1	0.41	0.09	0.2	66.67	0.046	Sig
	B	0.45	0.15	0.57	0.13	0.3	66.67	0.046	Sig
Shrama (Fatigue)	A	2.15	0.45	0.47	0.11	1.7	79.07	<0.001	ES
	B	1.8	0.25	0.6	0.14	1.55	86.11	<0.001	ES
Gaurava (Feeling Of Heaviness)	A	1.7	0.45	0.79	0.18	1.25	73.53	<0.001	ES
	B	1.2	0.35	0.88	0.2	0.85	70.83	<0.001	ES
GatraShula (Body Ache)	A	1.8	0.4	0.88	0.2	1.4	77.78	<0.001	ES
	B	1.6	0.45	0.81	0.18	1.15	71.88	<0.001	ES
Kopan (Irritability)	A	1.7	0.45	0.85	0.19	1.25	73.53	<0.001	ES
	B	1.55	0.45	0.91	0.2	1.1	70.97	<0.001	ES

Table 6: Depicting Effect of therapy on Objective parameters in Group A and Group B.

Variables	Group		Mean	SD	SE	t-Value	P-Value	% Change	Result
Hb%	A	BT	8.97	1.02	0.23	-22.163	0	30.94	ES
		AT	11.75	1.01	0.23				
	B	BT	8.98	0.75	0.17				
		AT	10.83	0.91	0.2				
RBCs	A	BT	3.74	0.54	0.12	-9.322	0	14.43	ES
		AT	4.27	0.44	0.1				
	B	BT	3.57	0.77	0.17				
		AT	4.2	0.56	0.12				
PCV	A	BT	29.45	3.55	0.79	-13.642	0	17.85	ES
		AT	34.7	3.16	0.71				
	B	BT	27.69	3.01	0.67				
		AT	31.79	2.58	0.58				
MCH	A	BT	25.91	3.73	0.83	-17.808	0	14.36	ES
		AT	29.63	3.7	0.83				
	B	BT	25.85	3.95	0.88				
		AT	29.19	3.46	0.77				
MCV	A	BT	76.04	9.05	2.02	-9.254	0	10.6	ES
		AT	84.11	6.41	1.43				
	B	BT	75.52	10.11	2.26				
		AT	81.3	7.38	1.65				
MCHC	A	BT	32.04	2.35	0.53	-6.852	0	8.58	ES
		AT	34.8	1.74	0.39				
	B	BT	33.49	1.13	0.25				
		AT	35.34	1.05	0.23				
ESR	A	BT	28.4	11.21	2.51	6.402	0	39.26	ES
		AT	17.25	5.76	1.29				
	B	BT	25.75	14.16	3.17				
		AT	17.3	7.13	1.59				
SERUM IRON	A	BT	55.56	22.19	4.96	-7.596	0	17.39	ES
		AT	65.22	23.17	5.18				
	B	BT	48.14	12.14	2.71				
		AT	56.05	10.85	2.43				
TIBC	A	BT	400.77	51.18	11.44	8.195	0	3.84	ES
		AT	385.37	50.81	11.36				
	B	BT	393.11	45.58	10.19				
		AT	382.55	47.1	10.53				
SERUM FERRITIN	A	BT	43.81	13.89	3.11	-9.885	0	26.08	ES
		AT	55.24	13.02	2.91				
	B	BT	40.66	13.46	3.01				
		AT	48.22	15.4	3.44				

Table 7: Depicting Intergroup Comparison between Group A and Group B on Subjective Parameter.

Variables	Group	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value	Result
Vaivarnya (Pallor)	A	21	420	190	0.759	NS
	B	20	400			
Aruchi (Anorexia)	A	20.78	415.5	194.5	0.863	NS
	B	20.23	404.5			
Daurbalya(Weakness)	A	21	420	190	0.755	NS
	B	20	400			
Bhrama (Giddiness)	A	22.85	457	153	0.147	NS
	B	18.15	363			
Hridspandana (Palpitation)	A	23.85	477	133	0.041	Sig
	B	17.15	343			
Shwasa (Dyspnoea)	A	22.65	453	157	0.211	NS
	B	18.35	367			
Pindikodvestana (Leg Cramps)	A	20.95	419	191	0.768	NS
	B	20.05	401			
Agnisada (Indigestion)	A	23.25	465	145	0.082	NS
	B	17.75	355			
Karnakshveda (Tinnitus)	A	21	420	190	0.708	NS
	B	20	400			
AkshikutaShoth (Periorbital Oedema)	A	19.9	398	188	0.655	NS
	B	21.1	422			
Shrama (Fatigue)	A	21.65	433	177	0.454	NS
	B	19.35	387			
Gaurava (Feeling Of Heaviness)	A	23.08	461.5	148.5	0.139	NS
	B	17.93	358.5			
GatraShula (Body Ache)	A	22.13	442.5	167.5	0.346	NS
	B	18.88	377.5			
Kopan (Irritability)	A	21.48	429.5	180.5	0.578	NS
	B	19.53	390.5			

P-Value for almost parameters was greater than 0.05. Hence it was concluded that, there was no significant difference between Group A and Group B (Table 8).

Overall effect of therapy in Group A and Group B

In Group A none of the patients had got complete remission. Seventy percent patients had got marked improvement, while 30% patient moderate improvement and no patient was found who had no change.

In Group B none of the patients had got complete remission. Sixty percent patients had got marked improvement, while 40% patient moderate improvement and no patient was found who had no change.

Discussion

The first step toward a conclusion is to have a discussion. Any scientific or methodical research work requires discussion. The logical reasoning of observations based on figures and facts is what discussion is all about.

Maximum (50%) patients belongs to age group 6 to 10 years, every age group is vulnerable. Several studies done across India, particularly Empowered Action Group (EAG) states reveals that the prevalence of anemia among is about 71% especially in the Rajasthan of 8 EAG states. The reason behind the anemia prevalence may be lack of dietary energy in their diet and low protein intake in comparison of increased demand in growing children [3]. Maximum 92.5% were Hindu and maximum patients (72.5%) were having vegetarian diet. The reason behind this fact may be that most of the Hindu families are strictly vegetarian as compared to other communities and vegetarians are more prone to IDA as they have less amount of absorbable Iron (Non hem iron) in their diet. Result of previously conducted studies also shows that Low socio-economic class, Hindu religions were significantly associated with high prevalence of IDA

[4]. Personal hygiene observed in maximum patients was moderate (52.50%) and poor (42.50%), The relationship between anemia and hygiene is inversely proportional, which may be because poor hygienic conditions contribute to infections and low immunity in children, which then leads to PEM-like conditions, which are thought to be the forerunner of anemia. Maximum patients were belonged to rural area (65), previous studies also revealed that anemia found higher among rural residents (46.6%) than urban residents (20.1%) [5]. The majority of the patients had Pitta-Kaphaja Prakriti, Kapha Dushti, which is responsible for Ama formation by blocking channels, and Pitta Dushti, which is responsible for Agni Dushti, which leads to improper digestion and Ama production, resulting in nutritional deficiency and anemia, may cause it. Maximum patients were having disturbed sleep, Disrupted sleep causes poor digestion, which leads to impaired absorption and malnourishment, which is the root cause of iron deficiency [6].

Both Group A and Group B result were extremely significant in most of subjective parameters followed by very significant and significant in some parameters. That might be because contents of both trial drugs mostly are Katu, Tikta and Kashaya Rasa [7] Pradhana, which enhance Agni through Deepana and Pachana characteristics, while Aam Pachana nullifies Agnimandya and Aruchi like Pandu Roga Lakshanas. Madhura Vipaka restores normality to vitiated Pitta.

Dhatri Lauha and Bibhitakadi Vatak both trial drugs showed extremely significant results in correcting objective parameters might be because of Lauha Bhasma (Dhatri Lauha) and Mandura Bhasma (Bibhitakadi Vatak). Pippali [8] and Shunthi [9] being a bio available herb, improves nutrition absorption and utilization throughout the body. Guda [10] contains Iron, which help to prevent anemia. Magnesium strengthens nervous system, relief in fatigue and help to relax muscles. Calcium, iron, copper, magnesium, and phosphorus are rich in black sesame seeds.

Table 8: Depicting Intergroup Comparison between Group A and Group B on Objective Parameter.

Parameters	Group	Mean Diff	SD	SE	t-Value	P-Value	Result
Hb%	A	2.78	0.6	0.13	5.027	0	ES
	B	1.86	0.6	0.13			
RBCs	A	0.54	0.3	0.06	-0.956	0.345	NS
	B	0.63	0.3	0.08			
PCV	A	5.26	1.7	0.39	2.543	0.015	Sig
	B	4.1	1.1	0.24			
MCH	A	3.72	0.9	0.21	1.029	0.31	NS
	B	3.34	1.4	0.31			
MCV	A	8.06	3.9	0.87	1.663	0.105	NS
	B	5.79	4.7	1.05			
MCHC	A	2.75	1.8	0.4	1.987	0.054	NS
	B	1.85	1	0.22			
ESR	A	11.35	7.5	1.67	0.932	0.357	NS
	B	8.85	9.4	2.1			
Serum Iron	A	10.03	5	1.11	1.575	0.123	NS
	B	7.92	3.4	0.76			
TIBC	A	15.52	8.2	1.83	1.987	0.054	NS
	B	10.96	6.2	1.39			
Serum Ferritin	A	11.43	5.2	1.16	0.996	0.325	NS
	B	9.64	6.2	1.38			

In present study, two classical compounds “Dhatri Lauha and Bibhitakadi Vatak” were selected to assess their efficacy and comparative study. These above formulations are described in Bhaishajya Ratnavali and Sushruta Samhita respectively in the management of “Pandu Chikitsa”.

Probable Mode of Action of Dhatri Lauha (Compound-A-1)

Dhatri Lauha contains Amalaki, Pippali, Marich, Shunthi, Haridra and Lauha Bhasma. When having a look at the pharmacodynamic properties of herbal drugs used in the formulation of Dhatri Lauha, it's clear that the majority of them have Laghu, Ruksha, Mridu, and Snigdha Gunas, Tikta, Katu, and Kashaya Rasas, Madhura and Katu Vipakas, Ushna and Sheeta Virya, and Tridosha Shamaka properties. Amalaki [11]- Tridosahara, Rasayana, enhance bioavailability and food absorption [12]. Shunthi [13]- Aampachana, Agni Deepana, Vatanulomana, enhance food absorption [14]. Pippali [15]- Aampachana, Agni Deepana, Rasayana, enhances food absorption [16]. Marich [17]- Agni Deepana, enhance food absorption [18]. Haridra- Krimihara, enhance digestive power [19]. Lauha Bhasma [20]- Raktavardhaka (Hematinic).

In Katu and Tikta Rasa, Akasha Mahabhuta and Laghu Guna are the most predominant. By virtue of Tikta and Katu Rasa, its Agni Deepana action increases metabolism and reduces the production of Aam. Vipaka of most of the ingredients are Katu and Madhura. Madhura vipaka is said to nourish all of the Dhatus, as well as Mana and Indriyas, alleviating Vata Dosha and increasing vital strength. Katu Vipaka increases the entire metabolism. Through their Ushna and Tikshna Gunas, Deepana and Pachana Dravyas promote gastric acidity, and Ushna Virya aids in the breakdown of the Srotorodha. As a result, metabolism increases, and digestion improves, resulting in proper Dhatu Poshana. Amalaki is best Rasayana, Tridosahara, and Pitta Shamaka.

Probable mode of action of study drug-Bibhitakadi Vatak (Compound A-2)

Ingredients of Bibhitakadi Vatak- Bibhitaka, Shunthi, Tila and Mandura Bhasma. Bibhitaki is mainly Kashaya Rasa Pradhana. Kashaya Rasa executes Pitta Shamaka function, which breaks Pandu Roga pathogenesis before Hridaprapti of vitiated Pittadosha. The Rasayana effect of Krishna Tila may be at the Agni level, i.e. Katu, Tikta

Rasa and Ushna Virya aid in the improvement of Agni (digestion and metabolism), Sukshma and Yogvahi Gunas of Krishna Tila help in the supply of various micro nutrients such as zinc, calcium, magnesium, vitamin E, lignans (antioxidants). Jaggery contains iron, magnesium, calcium, phosphorous, potassium and small amount of zinc and copper. It also contains vitamins like folic acid, vitamin B-complex. It prevents anemia and increases haemoglobin level [21,22]. Mandura Bhasma is Kashaya in Rasa, Sheeta in Guna and Virya. It is Vrissy, Deepana, Pachana and “Param-rakta-vriddhikara” [23] (best hematinic), “Balanam Atishasyate” [23] (best for children). Properties of Shunthi are the same as those mentioned above.

Conclusion

- Both trial drugs Dhatri Lauha and Bibhitakadi Vatak had extremely significant results.
- On comparing the effect of therapy in this study, consistently better percentage improvement in most of subjective and objective parameters was observed in Group A. So, it was concluded that Dhatri Lauha (Compound A-1 Syrup) in Group A showed better results over Bibhitakadi Vatak (Compound A-2 Syrup) in Group B.
- Both drugs Dhatri Lauha and Bibhitakadi Vatak are safe, effective and prescribed confidently in the treatment of Pandu Roga in children.

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