



A COMPARATIVE CLINICAL STUDY OF AYORAJADI CHURNA AND NISHA LOHA IN PANDU (IRON DEFICIENCY ANAEMIA)

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Abstract

Iron Deficiency Anaemia (IDA) is intimately associated with *Pandu Roga*, which is defined in *Ayurveda* as a *Pitta Pradhana Tridoshaja Vyadhi* including *Rasa-Raktavaha Srotas*. Due to gastrointestinal side effects, conventional oral iron therapy frequently has low compliance despite extensive public health campaigns. A possible substitute is provided by *Ayurvedic* herbo-mineral formulations as *Ayorajadi Churna* and *Nisha Loha*, which contain *Lauha Bhasma* in addition to *Deepana-Pachana* and *Rasayana* medications.

Serum ferritin, haemoglobin levels, and *Pandu Roga* clinical symptoms all improved statistically significantly in both groups ($p < 0.05$). However, Group A (*Ayorajadi Churna*) showed a relatively better improvement in serum ferritin, MCV, MCH, haemoglobin (10.56% vs. 4.33%), and overall clinical response. Compared to 25% of patients in Group B, 50% of patients in Group A showed noticeable improvement. Neither group experienced any negative medication responses.

Keywords: *Pandu Roga*, Iron Deficiency Anaemia, *Ayorajadi Churna*, *Nisha Loha*, *Lauha Bhasma*, *Tridoshaja Vyadhi*

Introduction

The pallor of the skin, sclera, nails, tongue, and other body parts in *Pandu roga* is caused by *Rakta-alpata*, which denotes a drop in haemoglobin levels. It is associated with the significant *Dhatu Rasa* and *Rakta*ⁱ. Globally, IDA affects 496 million non-pregnant and 32.4 million pregnant women aged 15-49 years (29-38% prevalence), with South Asia having the highest burden.ⁱⁱ India's NFHS-5 reports 59.1% anaemic adolescent girls and 67.1% children; 75% women have low dietary iron.ⁱⁱⁱ

Anaemia Mukh Bharat's 6×6×6 strategy delivered IFA to 15.4 crore beneficiaries (Q2 FY2024-25), yet progress lags WHO's 50% reduction target by 2025 due to poor compliance with constipation and gastric intolerance.^{iv} *Ayurvedic* herbo-minerals like *Ayorajadi Churna* (*Trikatu*, *Vidanga*, *Lauha Bhasma*) and *Nisha Loha* (*Haridra*, *Triphala*, *Kutki*, *Lauha Bhasma*) enhance *Jatharagni*, iron absorption via DMT1 upregulation (*Shunthi*), and erythropoiesis without side effects.^v

This trial compared efficacy in Hb restoration, symptom relief, and safety, hypothesizing superior outcomes versus allopathic iron via *Deepana-Pachana* and *Yogavahi* mechanisms.^{vi}

Materials and Methods

Study Design

Prospective, open-label, double-arm interventional trial (CTRI/2024/07/070971).

Duration: 45 days of treatment + 15 days follow-up.

Group A Patients are treated with Ayorajadi churna^{vii}

(A) AYORAJADI CHURNA

Table no 1. Quantity of ingredients taken for the preparation of Ayorajadi Churna

SR.NO	INGREDIENTS	LATIN NAME	PROPORTION	USED PART
1	MARICHA	<i>Piper nigrum</i>	1	Fruit
2	PIPPALI	<i>Piper longum</i>	1	Fruit
3	SHUNTHI	<i>Zingiber officinale</i>	1	Rhizome
4	VIDANGA	<i>Emblia ribes</i>	1	Fruit
5	LOHA BHASMA	-	1	-

METHOD OF PREPARATION:

All the herbal drugs will be collected in their proper time and in dry form. All these dried herbal ingredients will be taken in equal quantities. Then all the dried herbs will be grinded very finely, filtered with a cotton cloth, mixed with each other, and *loha bhasma* added to it. Patient will be instructed to take this with the *Anupana* of *Madhu*, *Sarpi*. Drugs will be prepared in the pharmacy of PGIA, Jodhpur.

Dose: 1 gm orally twice a day after meals.

Duration: 45days

Group B: Patients are treated with Nisha lauha^{viii} –

Table no 2. Quantity of ingredients taken for the preparation of Nisha Loha

S.R.NO	INGREDIENTS	LATIN NAME	PROPORTION	USED PART
1	HARITAKI	<i>Terminalia chebula</i>	1part	Fruit
2	BIBHITAKI	<i>Terminalia bellirica</i>	1part	Fruit
3	AMALAKI	<i>Emblica officinalis</i>	1part	Fruit
4	HARIDRA	<i>Curcuma longa</i>	1part	Rhyzome
5	DARUHARIDRA	<i>Berberis aristata</i>	1part	Stem, bark, root
6	KATUKI	<i>Picrorhiza kurroa</i>	1part	Root
7	LOHA BHASMA	-	6part	-

All the herbal drugs will be collected in their proper collection time and in dry forms. All these dried herbal ingredients will be taken in equal quantities. Then all the dried herbs will be grinded very finely, filtered with a cotton cloth and mixed with each other thoroughly and *loha bhasma* (6Part)

added with it. Patient will be instructed to take this with *Anupana of Madhu, Sarpi*. Drugs will be prepared in the pharmacy of PGIA, Jodhpur

Dose- 250mg orally twice a day after a meal

Duration: 45days

Participants

Inclusion:

Pandu roga is diagnosed according to subjective and objective parameters.

- Age group between 18 years and 60 years of either sex having cardinal symptoms of *Pandu*.
- Blood sample showing Hb percentage in the range [in men 7- 13 gm/dl and in females 7- 12 gm/dl]
- Patients are willing to participate in a clinical trial.

Exclusion:

Patients suffering from systemic diseases like renal disorders, heart disease, cancer, and tuberculosis.

- Patient with age below 18 years and above 60 years.
- Patients with Hb% less than 7 gm/dl.

Sample Size: 60 (Dropouts: 4 patients)

Interventions

Group A (*Ayorajadi Churna*): 1g BD with *Madhu-Ghrita* (45 days).

Group B (*Nisha Loha*): 250mg BD with *Madhu-Ghrita* (45 days).

Outcomes

Primary: Hb, serum ferritin (Day 0, 45, 60).

Secondary: CBC (MCV/MCH/MCHC/RBC), subjective (0-5 scale).

Assessed: baseline, Day 45, 60.

Safety: Adverse events monitored.

Statistical Analysis

Paired t-test (intra-group), independent t-test (inter-group), and Wilcoxon signed-rank (non-parametric).

$p < 0.05$ is significant.

Ethics

IEC-approved (PGIA Jodhpur). Informed consent obtained. Registered CTRI.

IEC NO- DSRRAU /PGIA/IEC/22-23/609

Results

Baseline Characteristics

It was found that 50% of the patients were from the 21-30years age group, 31.67% patients were seen in group of 11- 20 years, and 10% patients belonged to the age group of 41-50 years. Only 8.33% patients was belonged to the 31-40 years age group.

➤ Maximum i.e. 90 % of patients were female and the remaining 10% of patients were males.

➤ 58 patients (96.67%) were Hindus, 2 patients (3.33 %) were Muslims Community.

➤ 63.33 % patients were secondary level educated, 23.33 % patients were Graduate level educated and only 13.33% patients were primary level educated.

➤ 46.67%) belonged to urban area and the rest (46.67 %) from the rural area. The remaining Patients (6.67%) was belonged to Semi-urban areas.

➤ 44 (73.33%) studies in this series were married and remaining 16 patients (26.67 %) were unmarried.

- Majority i.e. 81.67 % of patients were from the middle class of society. 15 % were from the lower class part of society, 3.33 % were from the upper class.
- Patients i.e. 73.33 % were Student, 13.33% were labourers, 10 % were Pvt job and the Remaning 3.33% Patients have Govt Job.
- 61.67%) belonged to *Jangala Desha*, and the rest (30 %) were from the *Sadharan Desha*. The remaining patients (8.33%) belonged to *Aanup Desha*.
- 86.67 % of the patients were vegetarians, and 13.33% had mixed dietary habits.
- Maximum no. of patients i.e. 66.67 % were found to have *Samyak sleep* pattern. 30 % were having Alpa sleep Pattern and 3.33 % had a *Prabhuta* sleep pattern.
- The most prevalent *Aaharaja Nidana* type is "*Amla Lavan Atisevan*," with 53.33% of patients falling into this category. "*Virudha* " *Aaharaja Nidana* type follows, comprising 31.67% of patients, indicating a higher proportion of patients consuming incompatible or unsuitable foods for their constitution. "*Ushna Aaharaja Nidana* type comprising 15.00% respectively.
- 61.67.% of patients each practising daytime sleep. "*Vyayam varijana* " *Viharaja Nidana* type follows, with 30.00% of patients. "*Vegvidharana* " *Viharaja Nidana* types are reported by 6.67% of patients.
- "Tea/Coffee addiction stands out as the most prevalent, with 56.67% of participants reporting it."Tea" addiction follows closely, with 40% of participants affected. "Coffee" addiction is reported by 1.67% of participants, while "Alcohol " addiction is present in 1.67% of participants.
- 61.67 % of the patients fall into this *Mandagni* group. "*Vishmagi*" *Agni* type follows, comprising 35% of the patients. "*Samagni*" *Agni* type is reported by 3.33% of the patients.
- distribution of different *Agni* types (digestive fire) among the 60 patients. Among the categories, "*Mandagni*" *Agni* type is the most prevalent, with 61.67 % of the patients falling into this group. "*Vishmagi*" *Agni* type follows, comprising 35% of the patients. "*Samagni*" *Agni* type is reported by 3.33% of the patients.
- " *Avara Vyayama Shakti*," with 61.67% of participants. *Madhyam Vyayama Shakti* exercise is practised by 38.33% of participants, and *Pravra Vyayama Shakti* exercise is reported by 0.00% of participants.
- *Vata Kaphaja*" physical constitution type is with 10.00% of the patients falling into this group. "*Pitta-Kaphaja*" physical constitution type follows, comprising 45.00% of the patients. "*Vata-Pitta*" physical constitution type is reported by 45.00% of the patients.
- *Madhyam*" *Sara* type is the most prevalent, with 75.00% of the patients falling into this group. "*Avara*" *Sara* type follows, comprising 25.00% of the patients. "*Pravara*" *Sara* type is reported by 0.00% of the patients.
- *Madhyama*" *Sanhanana* type is the most prevalent, with 86.67% of the patients falling into this group. "*Avara*" *Sanhanana* type follows, comprising 6.67% of the patients. "*Pravar*" *Sanhanana* type is reported by 6.67 % of the patients.
- "6 RAS" *Rasa Satmya* type is reported by 100.00% of the patients, while "1 RAS" and "2 RAS" types are not reported by any participants.
- "*Madhyama*" *Satva* type is the most prevalent, with 56.67% of the patients falling into this group. "*Avara*" *Satva* type follows, comprising 43.33% of the patients. "*Pravar*" *Satva* type is reported by 0.00% of the patients.
- "*Madhyama Aharjaran Shakti* " type is the most prevalent, with 76.67% of the patients falling into this group. "*Avara Aharjaran Shakti*" type follows, comprising 23.33% of the patients. "*Pravar Aharjaran Shakti*" type is reported by 0.00% of the patients.

Outcomes:

Subjective Relief (mean %; all Wilcoxon $p < 0.001$ intra-group)

Table no.3 Comparison between Group A and Group B using the Mann-Whitney U test.

Variable	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value	Result
<i>Panduta</i>	Group A	28	29.39	823.00	367.000	0.567	NS
	Group B	28	27.61	773.00			
	Total	56					
<i>Daurbalyta</i>	Group A	28	32.68	915.00	275.000	0.009	NS
	Group B	28	24.32	681.00			
	Total	56					
<i>Aruchi</i>	Group A	28	30.54	855.00	335.000	0.218	NS
	Group B	28	26.46	741.00			
	Total	56					
<i>Shwasa</i>	Group A	28	27.00	756.00	350.000	0.375	NS
	Group B	28	30.00	840.00			
	Total	56					
<i>Akshikuta Shotha</i>	Group A	28	27.75	777.00	371.000	0.677	NS
	Group B	28	29.25	819.00			
	Total	56					
<i>Pindikodweshtan</i>	Group A	28	29.39	823.00	367.000	0.567	NS
	Group B	28	27.61	773.00			
	Total	56					
<i>Jwara</i>	Group A	28	24.52	686.50	280.500	0.039	Sig
	Group B	28	32.48	909.50			
	Total	56					
<i>Rukshata</i>	Group A	28	32.82	919.00	271.000	0.012	Sig
	Group B	28	24.18	677.00			
	Total	56					
<i>Hridspandan</i>	Group A	28	33.32	933.00	257.000	0.007	Sig
	Group B	28	23.68	663.00			
	Total	56					
<i>Bhram</i>	Group A	28	28.54	799.00	391.000	0.983	NS
	Group B	28	28.46	797.00			
	Total	56					

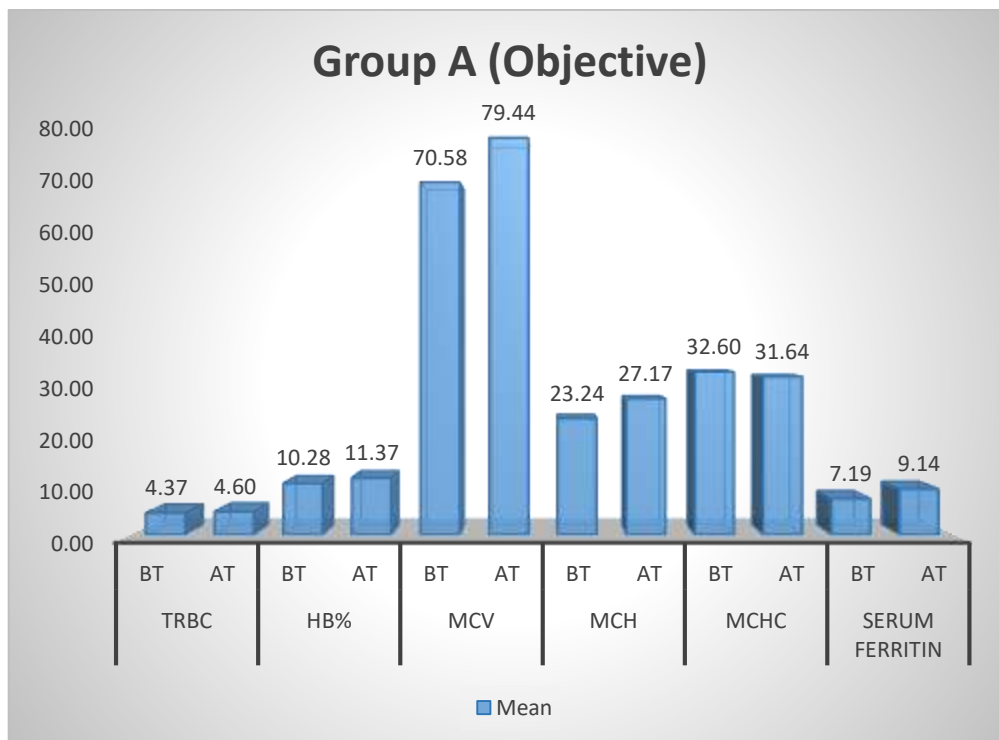
Mann Whitney U Test is carried out for comparison between Group A and Group B. From above table, we can observe that, P-Value for all parameters is greater than 0.05. Hence, we can conclude that, there is no significant difference between Group A and Group B.

And the P-value for *Jwara*, *Rukshata* and *Hridspandan* parameters is less than 0.05. Hence, we can conclude that, there is a significant difference between Group A and Group B.

OBJECTIVE PARAMETERS

Table no. 4 Comparison between Group A and Group B using Paired t-test.

Group A		Mean	N	SD	SE	t-Value	P-value	% Change	Result
TRBC	BT	4.37	28	0.51	0.10	-1.014	0.320	5.20	NS
	AT	4.60	28	0.51	0.10				
Hb%	BT	10.28	28	1.17	0.22	-26.039	0.000	10.56	Sig
	AT	11.37	28	1.17	0.22				
MCV	BT	70.58	28	6.51	1.23	-14.799	0.000	12.55	Sig
	AT	79.44	28	7.15	1.35				
MCH	BT	23.24	28	2.66	0.50	-30.338	0.000	16.90	Sig
	AT	27.17	28	2.69	0.51				
MCHC	BT	32.60	28	1.27	0.24	0.924	0.364	2.94	NS
	AT	31.64	28	5.57	1.05				
SERUM FERRITIN	BT	7.19	28	1.99	0.38	-23.903	0.000	27.19	Sig
	AT	9.14	28	1.86	0.35				



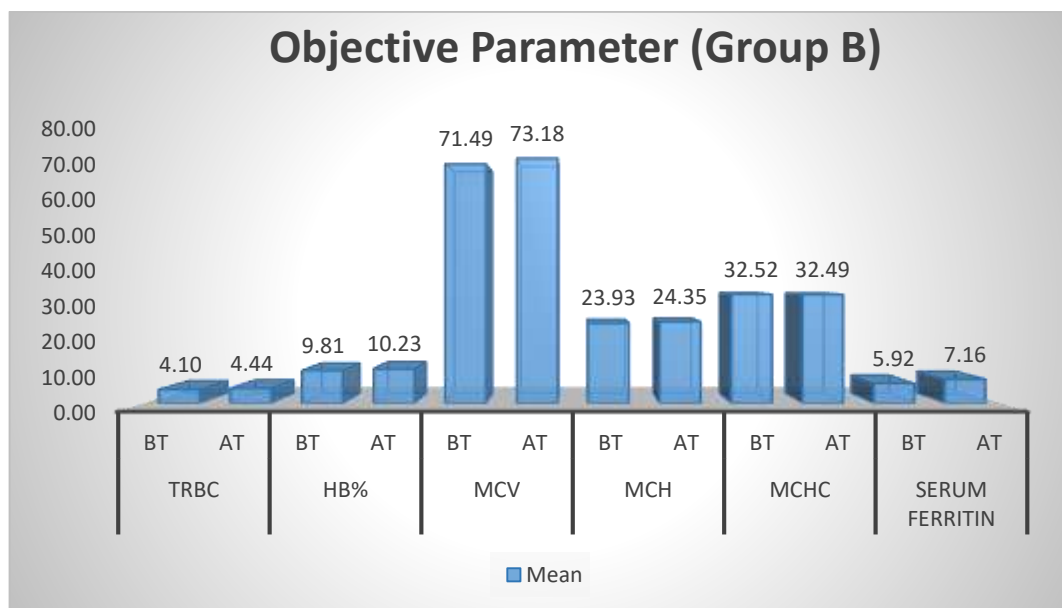
Since observations are quantitative, paired t-test is carried out to test significance in Group A. From above table, we can observe that P-Value for all parameters is less than 0.05. Hence, we can conclude that there is significant change observed in Group A.

And P-Value for TRBC and MCHC parameters is greater than 0.05. Hence, we can conclude that there is no significant change observed in Group A.

Table no. 5 Comparison between Group A and Group B using Paired t-test.

Group B		Mean	N	SD	SE	t-Value	P-value	% Change	Result
TRBC	BT	4.10	28	0.71	0.13	-8.210	0.000	8.32	NS
	AT	4.44	28	0.67	0.13				
Hb%	BT	9.81	28	1.43	0.27	-26.434	0.000	4.33	Sig

	AT	10.23	28	1.42	0.27				
MCV	BT	71.49	28	6.03	1.14	-4.451	0.000	2.37	Sig
	AT	73.18	28	6.17	1.17				
MCH	BT	23.93	28	2.56	0.48	-6.182	0.000	1.78	Sig
	AT	24.35	28	2.61	0.49				
MCHC	BT	32.52	28	2.62	0.50	0.883	0.385	0.10	NS
	AT	32.49	28	2.62	0.49				
SERUM FERRITIN	BT	5.92	28	1.78	0.34	-6.819	0.000	20.87	Sig
	AT	7.16	28	1.91	0.36				



Since observations are quantitative, paired t-test is carried out to test significance in Group B. From above table, we can observe that P-Value for all parameters is less than 0.05. Hence, we can conclude that there is significant change observed in Group B.

And P-Value for TRBC and MCHC parameters is greater than 0.05. Hence, we can conclude that there is no significant change observed in Group B

Overall Effect (n=56)

Table no.6 (% Effect Parameter (Subjective))

Parameter (Subjective)	% Effect	
	Group A	Group B
<i>Panduta</i>	64.44	62.79
<i>Daurbalyta</i>	64.81	56.52
<i>Aruchi</i>	74.47	70.73
<i>Shwasa</i>	72.73	62.79
<i>Akshikuta Shotha</i>	83.33	63.64
<i>Pindikodweshtan</i>	72.50	58.70
<i>Jwara</i>	91.38	72.41
<i>Rukshata</i>	89.47	68.57
<i>Hridspandan</i>	72.22	55.17
<i>Bhram</i>	78.79	78.79

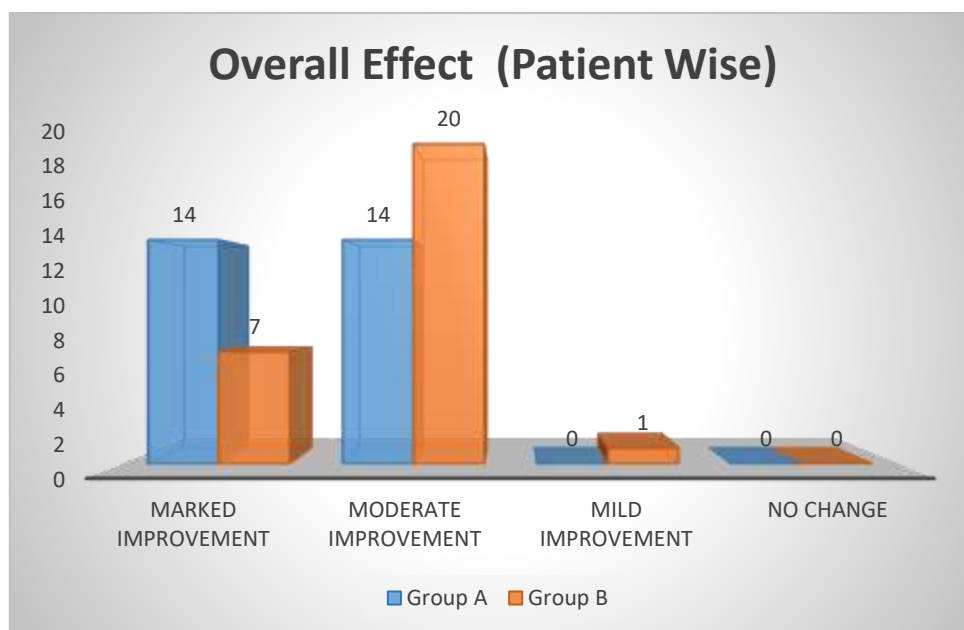
Average % Effect	77.28	65.01
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Subjective Parameters (% Effect):

- On analysing the subjective parameters, it was observed that in Group A, the maximum improvement was noted in *Jwara* (91.43%), followed by *Akshikuta Shotha* (83.33%), *Bhrama* (78.79%), *Aruchi* (74.47%), *Shwasa* (72.73%), and *Rukshata* (89.47%). Other parameters, such as *Panduta* (64.44%), *Daurbalya* (64.81%), and *Hridayaspandana* (72.22%), also showed significant relief. The overall average percentage effect in Group A was 77.28%.
- In Group B, maximum improvement was observed in *Bhrama* (78.79%) and *Aruchi* (70.73%), followed by *Jwara* (72.41%) and *Shwasa* (62.79%).
- A relatively lesser effect was observed in *Hridayaspandana* (55.17%), *Daurbalya* (56.52%), and *Panduta* (62.79%).
- The overall average percentage effect in Group B was 65.01%, which is comparatively lower than that of Group A (77.28%).

Table no.7 (Overall Effect (Patient Wise))

Overall Effect (Patient Wise)	Group A		Group B	
	N	%	N	%
Marked Improvement	14	50.00%	7	25.00%
Moderate Improvement	14	50.00%	20	71.43%
Mild Improvement	0	0.00%	1	3.57%
No Change	0	0.00%	0	0.00%
TOTAL	28	100.00%	28	100.00%

**Discussion**

Pathogenesis alignment: *Agnimandya* → *Rasa Dusti* → *Rakta Kshaya* reversed by *Pachana* (piperine ↑DMT1) and *Lekhana* (*Vidanga*, *Krimighna*). Superior to allopathic iron (no GI intolerance).

The current clinical investigation shows that both *Nisha Loha* and *Ayorajadi Churna* are useful in treating *Pandu Roga*, leading to statistically significant improvements in both objective haematological measures and subjective symptoms. This supports the *Ayurvedic* theory that *Pandu Roga* is a condition that starts with *Agnimandya* and progresses to *Rasa Dusti* and *Rakta Kshaya*. Comparatively better therapeutic results were shown by *Ayorajadi Churna*. *Trikatu* (*Shunthi*, *Maricha*, and *Pippali*), which is renowned for its strong *Deepana-Pachana* activity, is a component of the formulation. Piperine, which is found in *pippali* and *maricha*, functions as a bioenhancer, correcting digestive impairment and increasing transporter activity to improve intestine absorption of iron. By addressing the latent parasite and metabolic causes of chronic anaemia, *Vidanga* contributes *Krimighna* and *Lekhana* characteristics.

Rakta Dhatu production and erythropoiesis are directly supported by *Lauha Bhasma*. The *Rasayana* effect of *tripphala* and the hepatoprotective and metabolic regulating properties of *kutki* and *haridra* are responsible for *Nisha Loha*'s notable improvement. These medications aid in iron metabolism and liver function, which gradually raises ferritin and haemoglobin levels. However, Group B's comparatively smaller improvement in comparison to Group A may be explained by the lack of powerful *Deepana-Pachana* components like *Trikatu*.

Due to its *Yogavahi* function, the administration of *Madhu-Ghrita* as *Anupana* in both groups probably increased medication bioavailability, enabling deeper tissue penetration and better therapeutic response. Crucially, none of the participants had constipation or gastrointestinal intolerance, which are frequently linked to traditional oral iron preparations, suggesting improved tolerability and compliance.

Overall, the results point to the necessity of correcting both *Rakta Poshana* and *Agnimandya* in order to effectively manage *Pandu Roga*. The findings validate *Ayurvedic* herbo-mineral formulations as patient-friendly, safe, and efficient substitutes for synthetic iron therapy.

Limitations: Open-label, short-term.

Conclusion

For the treatment of *Pandu Roga* (IDA), *Ayorajadi Churna* and *Nisha Loha* are both safe and effective. However, *Ayorajadi Churna* demonstrated greater therapeutic efficacy, indicating that it may be a more effective substitute for traditional oral iron therapy in the treatment of anaemia.

➤ The relief percentage in Group A Hb percent is 10.56%, and TRBC (5.20%), MCV(12.55%) & MCH (16.90%), MCHC (2.94%), SERUM FERRITIN (27.19%)

➤ Group B % Relief- Hb percent is 4.33%, and TRBC (8.32%), MCV (2.37%) & MCH (1.78%), MCHC (0.10%), SERUM FERRITIN (20.87%)

➤ P-value for Hb%, MCV, MCH and Serum Ferritin parameter is less than 0.05. Hence, we can conclude that there is a significant change observed in Group A and Group B.

➤ P-value for TRBC and MCHC parameters is greater than 0.05. Hence, we can conclude that there is no significant difference between Group A and Group B.

In Group A, out of 28 patients, 14 patients (50%) showed Marked Improvement while the remaining 14 patients (50%) showed Moderate Improvement. None of the patients in this group showed Mild Improvement or No Change, indicating that all the patients responded positively to the treatment regimen.

In Group B, out of 28 patients, 7 patients (25%) showed Marked Improvement, 20 patients (71.43%) exhibited Moderate Improvement, and 1 patient (3.57%) showed Mild Improvement. No patient remained unchanged in this group as well.

Thus, it can be inferred that Group A exhibited a higher proportion of marked improvement (50% vs. 25% in Group B), whereas Group B showed more moderate improvement (71.43% vs. 50% in Group A).

➤ Group A Shows better results in comparison to Group B.

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