

**CLINICAL EFFICACY OF AMALAKI AVLEHA IN THE MANAGEMENT OF PANDU W.S.R. TO IRON DEFICIENCY ANAEMIA"-A RESEARCH ARTICLE****Samiksha Sharma**

Department of P G Studies in Kayachikitsa, Jammu Institute of Ayurveda and Research, Jammu

Corresponding Author: samikshasharma2306@gmail.com<https://doi.org/10.46607/iamj0811042023>**(Published Online: April 2023)****Open Access**

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Article Received: 29/03/2023 - **Peer Reviewed:** 30/03/2023 - **Accepted for Publication:** 03/04/2023.**ABSTRACT**

Introduction: Iron deficiency anemia (IDA) is one of the most common nutritional deficiencies worldwide, which can be correlated to *Pandu* described in ayurvedic classics. It is a systemic disease that involves multiple systems rather than a mere haematological condition associated with Anaemia. Poor absorption of iron is one of the main reasons for IDA. *Ayurveda* can provide better management not only in substituting and replenishing deficient nutrients but also can play a vital role in correcting metabolism. **Aims:** To evaluate the efficacy of *Amalaki Avleha* in the management of *Pandu* w.s.r. IDA. **Materials and Methods:** A randomized controlled open clinical trial was conducted at the Jammu Institute of Ayurveda and Research. Iron deficient anaemic patients ($n = 30$) having Hb $<12g\%$ in females and $13gm\%$ in males were selected. The assessment was done on the basis of relief in cardinal symptoms of *Pandu* and hematological parameters. **Results and Conclusion:** Clinical response of *Amalaki Avleha* has given the best results for parameters like *Panduta*, *Agnimandya*, *Aruchi*, *Shrama*, and *Daurbalyata*.

Keywords: *Amalaki avleha*, iron deficiency anemia, *Pandu*, *Amalaki Avleha***INTRODUCTION**

Pandu is a *Varnopalakshita Vyadhi*, where in paleness is path gnomie. Paleness-also known as

pale complexion or pallor is an unusual lightness of skin colour compared with normal complexion.

Pandu is a *Pitta Pradhan Vyadhi* and since *Pitta* is responsible for the normal colour of the body, if it gets vitiated, impairment of colour and complexion occurs. So, the disease characterized by *Pandu Varna* due to a significant deficiency of *Rakta Dhatu* is known as *Pandu roga*. The word Anaemia (an-without, emia-blood), in Greek means (lack of blood)¹. Anaemia refers to a state in which the level of haemoglobin in blood is below the normal range appropriate for age and sex². It is a systemic disease that involves multiple systems rather than a mere haematological condition associated with Anaemia. Basic pathological changes, signs, and symptoms of both Iron deficiency anaemia and *Pandu Roga* explained in *Ayurveda* are similar. *Pandu Roga* has a similarity with the Anaemia of the modern system in aspects of etiology, signs, and symptoms³. *Ayurveda* can provide better management not only in substituting and replenishing deficient nutrients but also can play a vital role in correcting metabolism. *Amalaki Avleha* is a non-iron formulation indicated in *Panduroga Adhikara* in *Bhaishajya Ratnavali*. (12/116-119)

MATERIALS AND METHODS

This clinical trial was conducted on 30 Patients fulfilling the criteria and was selected from OPD and IPD of *Kayachikitsa* Department of Jammu Institute of *Ayurveda* and Research Hospital, and Shri Sain charitable trust and hospital, urban wing, Janipur, Jammu, also special camps were conducted for the study.

INCLUSION CRITERIA:

- Patients between 20-60 yrs. of age.
- Hb percentage 7-12 gm%.⁴
- Patients having classical symptoms of *Pandu Roga*, irrespective of sex, food habits, and socio-economic status.

Table 1: Ingredients of Triphaladya Guggulu

S.no.	Drugs	Botanical name	Part used
1	<i>Amalaki</i> ⁵	<i>Embelica officinalis</i>	Fruit
2	<i>Pippali</i> ⁶	<i>Piper longum</i>	Fruit
3	<i>Yashtimadhu</i> ⁷	<i>Glychrriza glabra</i>	Root
4	<i>Draksha</i> ⁸	<i>Vitis vinifera</i>	Fruit
5	<i>Shunthi</i> ⁹	<i>Zingiber officinalis</i>	Rhizome
6	<i>Vanshlochan</i> ¹⁰	<i>Bambusa arundinaceae</i>	Vanshlochan

EXCLUSION CRITERIA:

- Patients below 20 yrs. and above 60 yrs.
- Patients with Hb % below 7 and above 12.
- Those suffering from any other systemic disorders and acute infections.
- Haemolytic anaemia due to any cause.
- Anaemia due to acute or chronic blood loss.
- Aplastic anaemia.
- Anaemia is due to chronic diseases like non-infectious inflammatory disease, chronic renal failure, malignancy, etc.
- Pregnant women.
- Patients having any other major complicated disease like Cardiac disease were excluded.

DIAGNOSTIC CRITERIA:

The diagnosis was carried out on the basis of signs and symptoms mentioned in *Ayurveda* and conventional medical science. All patients were examined and assessed by detailed history, through clinical examination and relevant laboratory investigations to establish the final diagnosis

DRUG AND DOSAGE:

The trial drug *Amalaki avleha* was administered in the following dosage for a period of 60 days.

Dosage: 6 gm B.D, Timings: Morning and Night after food, Anupan: *Anushna jala*

CRITERIA FOR ASSESSMENT: Assessment of clinical trial was done based upon the changes in both subjective and objective param

SUBJECTIVE PARAMETERS:

- Improvement in clinical features namely *Panduta*, *Agnimandya*, *Aruchi*, *Dourbalya*, *Hridya*
Spandana, *Shrama*, *Bhrama*, *Shiroruk*, *Shwasa*

OBJECTIVE PARAMETERS:

Laboratory investigations: Hb%, TLC, RBC count

			(silicious crystalline deposition in nodal part of female plants)
7	<i>Sharkara</i> ¹¹	Sacharaum officinarum	
8	<i>Madhu</i> ¹²	Honey	

Method for preparation of Drug:

Fresh *Swarasa* was extracted from *Amalaki* fruit, it was then put to heat on a low flame. *Sharkara* was added to this *swarasa* and heating was continued till *Pak Lakshanas* were observed. After that *Prakshepa Dravyas* like *Pippali*, *Shunthi*, *Vanshlochan*, and *Yashtimadhu* were added followed by *Draksha Kalka*, above mixture was left to cool. On cooling, *Madhu* was added and the mixture was stirred. *Avleha* was then kept in an airtight container.

GRADING OF ASSESSMENT CRITERIA

Table No.2:Assessment criteria For Panduta¹³

➤ *Panduta*

	SCORE
No Pallor	0
Conjunctiva slightly pale, nail not pale	1
Conjunctiva pale, nail slightly pale	2
Conjunctiva, nail gross pale	3

Table No.3:Assessment Criteria For Daurbalyata¹⁴

➤ *Daurbalyata*

	SCORE
No weakness	0
Weakness not affecting daily activities	1
Weakness affecting daily activities	2
Weakness even at rest	3

Table No.4:Assessment Criteria for Aruchi¹⁵

Aruchi

	SCORE
Not present	0
Takes food twice a day	1
Takes food once a day	2
Does not take food	3

Table No.5:Assessment Criteria for Agnimandya¹⁶

➤ *Agnimandya*

	SCORE
Not present	0
Feeling less hunger at the first meal but good hunger after 2 nd meal	1
Feeling hunger only at the second meal but not before that	2
No hunger feeling	3

Table No.6:Assessment Criteria for Shrama¹⁷

➤ *Shrama*

	SCORE
Not present	0
Fatigue not affecting daily activities	1
Fatigue affecting daily activities	2
Fatigue even at rest	3

Table No.7:Assessment Criteria For Shwasa¹⁸

➤ **Shwasa**

	SCORE
No dyspnoea	0
Mild dyspnoea with routine activities	1
Dyspnoea on exertion	2
Dyspnoea at rest	3

Table No.8:Assessment Criteria for Bhrama¹⁹

➤ **Bhrama**

	SCORE
Not present	0
Mild Bhrama with daily activities	1
Bhrama affects daily activities intermittently	2
Bhrama affects daily activities frequently	3

Table No.9:Assessment Criteria for Hridayaspandana²⁰

➤ **Hridayaspandana**

	SCORE
Not present	0
Mild palpitations with daily activities	1
Palpitations on exertion	2
Palpitations at rest	3

Statistical analysis

The obtained data were analyzed statistically. The Mann-Whitney U test was used for subjective parameters and Paired t-test was used for objective parameters. A p-value of < 0.05 was considered statistically significant and p-values < 0.01 and < 0.001 was considered highly significant. The level of significance was noted and interpreted accordingly.

➤ **Overall Assessment**

Overall assessment of therapy was assessed based upon the significance of Pairedt-Test values in objective parameters, and the Mann-Whitney U test in subjective parameters. Considering the overall improvement shown by the patient in signs and symptoms, the total effect of therapy has been assessed as below. It is assessed on the basis of the percentage of relief obtained:

TABLE NO.10:Assessment criteria for the overall effect of therapy

Cured	76% To 100%	Relief In Subjective Signs and Symptoms.
Markedly Improved	51% To 75%	Relief In Subjective Signs and Symptoms
Improved	26% To 50%	Relief In Subjective Signs and Symptoms.
Unchanged	Up To 25%	Relief In Some Subjective Sign And Symptoms Only.

OBSERVATIONS

Out of the 30 patients registered it was found that a maximum number of patients 36.6% were between the age group of 15-30 years and 33.3% were between the age group of 31-45years. The present study found as the incidence in males was 26.66% and in females, it was 73.33% of the cases. Thus, we may say that this disease is more prevalent in females.

54% of subjects were vegetarians, they are more prone to iron deficiency anaemia because nonheme iron is found in varying degrees in the foods of plant origin and the absorption of which is limited due to the presence of fiber, phytate, phosphate, and poly phenol present in vegetables. It was observed that the majority of the patients were taking *Amla lavana*(43.33%), followed by *Madhura amla*(33.3%) and *Amla katu rasa* (23.3%). *Amla, Lavana Rasa* directly vitiates *Rakta* and produces *Raktapradoshaja Vikaras* like *Pandu*. 76.6% of patients were addicted to tea coffee, Tea contains Tannins, and Polyphenolic compounds present in tea also strongly inhibit dietary non-heme iron absorption.56.6% of patients were having *Pitta-kapha Prakriti* and 40% were of *Vata-pitta Prakriti*. The *Prakriti* has dominant *Pitta* in the body and *Pandu* is more likely to be a *Pittajavikara* which might be the reason for the majority of patients being of these groups.

RESULTS

Effect of Amalaki avleha on PANDUTA

The mean value before and after treatment was found to be 2.1 and 1.1 respectively which was statistically highly significant with a p-value <0.001.

Effect of Amalaki avleha on ARUCHI

The mean value before and after treatment was found to be 1.23 and 0.3 respectively which was statistically highly significant with a p-value <0.001.

Effect of Amalaki avleha on AGNIMANDYA

The mean value before and after treatment was found to be 1.47 and 0.53 respectively which was

statistically highly significant with a p-value <0.001.

Effect of Amalakiavlehaon DAURBALYTA

The mean value before and after treatment was found to be 1.77 and 0.93 respectively which was statistically highly significant with a p-value <0.001

Effect of Amalaki avleha on SHRAMA

The mean value before and after treatment was found to be 1.37 and 0.57 respectively which was statistically highly significant with a p-value <0.001.

Effect of Amalaki avleha on BHRAMA

The mean value before and after treatment was found to be 0.4 and 0.2 respectively which was not statistically significant with a p-value of 0.21

Effect of Amalaki avleha on SHWASA

The mean value before and after treatment was found to be 0.57 and 0.43 respectively which was not statistically significant with a p-value of 0.58.

Effect of Amalaki avleha on HRIDYASPANDANA

The mean value before and after treatment was found to be 0.7 and 0.0.6 respectively which was not statistically significant with a p-value of 0.75

Effect of Amalaki avleha on SHIRORUKA

The mean value before and after treatment was found to be 0.83 and 0.53 respectively which was not statistically significant with a p-value of 0.15.

Effect of Amalaki avleha on Hb

The mean value before and after treatment was found to be 9.3 and 10.09 respectively which was statistically highly significant with a p-value <0.001

Effect of Amalaki avleha on TLC

The mean value before and after treatment was found to be 7910 and 7966.66 respectively which was not statistically significant with a p-value of 0.69.

Effect of Amalaki avleha on RBC count

The mean value before and after treatment was found to be 3.85 and 4.34 respectively which was statistically highly significant with a p-value <0.001

Overall Effect of The Treatment

Statistical analysis indicates, improvement in some of the clinical parameters, a 39.66% improvement was noticed

Table no.11: Effect of Amalaki avleha on PANDUTA

	N	MEAN	S.E.M	S.D	P value
BT	30	2.1	0.14	0.76	P<0.001
AT	30	1.1	0.09	0.58	

Table no.12: Effect of Amalaki avleha on ARUCHI

	N	MEAN	S.E.M	S.D	P value
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BT	30	1.23	0.11	0.63	P<0.001
AT	30	0.3	0.09	0.53	

Table no.13: Effect of Amalaki avleha on AGNIMANDYA

	N	MEAN	S.E.M	S.D	P value
BT	30	1.47	0.12	0.68	P<0.001
AT	30	0.53	0.1	0.57	

Table no.14: Effect of Amalaki avleha on DAURBALYTA

	N	MEAN	S.E.M	S.D	P value
BT	30	1.77	0.09	0.5	P<0.001
AT	30	0.93	0.08	0.45	

Table no.15:Effect of Amalaki avleha on SHRAMA

	N	MEAN	S.E.M	S.D	P value
BT	30	1.37	0.12	0.67	P<0.001
AT	30	0.57	0.11	0.63	

Table no.16:Effect of Amalaki avleha on BHRAMA

	N	MEAN	S.E.M	S.D	P value
BT	30	0.4	0.12	0.67	P=0.21(N.S)
AT	30	0.2	0.09	0.48	

Table no.17:Effect of Amalaki avleha on SHWASA

	N	MEAN	S.E.M	S.D	P value
BT	30	0.57	0.13	0.73	P=0.58(N.S)
AT	30	0.43	0.1	0.57	

Table no.18:Effect of Amalaki avleha on HRIDYASPANDANA

	N	MEAN	S.E.M	S.D	P value
BT	30	0.7	0.16	0.88	P=0.75(N.S)
AT	30	0.6	0.4	0.77	

Table no.19;Effect of Amalaki avleha on SHIRORUKA

	N	MEAN	S.E.M	S.D	P value
BT	30	0.83	0.14	0.79	P=0.15(N.S)
AT	30	0.53	0.1	0.57	

Table no.20:Effect of Amalaki avleha on Hb

	N	MEAN	S.E.M	S.D	t value	p value
BT	30	9.3	0.13	0.72	22.35	P<0.001
AT	30	10.09	0.11	0.58		

Table no.21 : Effect of Amalaki avleha on TLC

	N	MEAN	S.E.M	S.D	t value	p value
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BT	30	7910	147.03	805.31	0.4	P=0.69
AT	30	7966.66	159.48	873.49		

Table no.22: Effect of Amalaki avleha on RBC count

	N	MEAN	S.E.M	S.D	t value	p-value
BT	30	3.85	0.05	0.26	13	P<0.001
AT	30	4.34	0.05	0.25		

Table no.23: Overall Effect of The Treatment

S.No.	Assessment criteria	Percentage improvement
1	<i>Panduta</i>	47.619%
2	<i>Aruchi</i>	75.60%
3	<i>Agnimandya</i>	63.94%
4	<i>Daurbalya</i>	47.45%
5	<i>Shrama</i>	58.39%
6	<i>Bhrama</i>	50%
7	<i>Shwasa</i>	24.5%
8	<i>Hridyaspandana</i>	14.28%
9	<i>Shiroruk</i>	36.14%
10	Hb	8.49%
11	TLC	0.72%
12	RBC count	12.72%

DISCUSSION

PROBABLE MODE OF ACTION OF AMALAKI AVALEHA:

The beneficial Pharmacotherapeutic action of the Drug, observed in this study may be explained as *Amalaki* is *Panch Rasa Amla Pradhan*(*Lavan Varjita*), have *Guru, Laghu, Ruksha Gunas, Madhura Vipaka, is Tridoshara esp. Pittahara, have Rasayan, Balya, Vrishya Karmas, is Raktavikarahara, Agnimandyahar, Daurbalya nashak.* The *Deepana, Anulomana, and Shonitsthapana Karma* of *Amalaki* help in alleviating the *Agnimandya, Daurbalya, and Shrama*-like symptoms in *Pandu Roga*²¹. It has been found that *Amalaki* exhibits promising antioxidant potential by virtue of antioxidants present in it which include Vitamin C, bioflavonoids, flavones, polyphenols, and carotenoids²². Owing to these properties *Amalaki* might have helped in *Samprapti Vighatana* of *Pandu*. *Amalaki* is also a potent source of Vitamin C (ascorbic acid) which is the most potent enhancer of non-heme iron absorption by

forming a chelate with ferric iron at acid pH that remains soluble at the alkaline pH of the duodenum²³. *Shunthi* has *Katu Rasa, laghu Snigdha Guna, Ushna Veerya, Madhura Vipaka,* is *Vatakaphashamak,* have *Rochana, Deepan, Pachana, Sleshmahara* properties, works in *Agnimandya, Aruchi, Anaha, Samanya Dourbalya*²⁴. Since, *Pandu* is a *Ruksha Guna Bhuyishta Vyadhi, Shunthi, Pippali, Yashtimadhu* having *Snigdha guna* may have a significant role in *Pandu*. *Pippali* has *Katu rasa, Laghu Snigdha, Tikshna Guna, Anushna Sheeta Veerya, Madhura Vipaka, Kapha Vatashamak, Deepana, Yakrituttejaka, Raktavardhak, Raktashodhaka, Rasayan properties,* is a proved drug to increase bioavailability. *Pippali* improves digestion and reduces *Ama Utpatti*, which counteracts poor digestion found in *Pandu Roga*. It forms one of the ingredients in various compound preparations used for anorexia, and dyspepsia (CSIR, 1969) *Yashtimadhu* possess *Madhura Tikta Rasa* which pacifies *Pitta*. As per *Charaka, Yashtimadhu* is a *Dravya* mentioned under

Shonithasthapana Gana. Madhu has *Madhura, Kashaya Rasa, Guru Ruksha Guna, Sheeta Veerya, Katu Vipaka, Tridoshanashaka (su), and Vatakaraka, Kaphapittashamak (ch), have Varnya, Bruhmana* properties. Honey increases antioxidant agents like vitamin C concentration by 47%, increases serum iron by 20%, and decreases plasma ferritin by 11%²⁵. The presence of a variety of flavonoids, phenols, vitamins, minerals, antioxidant enzymes, and other factors in the honey composition increases its anti-inflammatory and anti-oxidant properties. *Sharkara* has *Madhura Rasa, Sheeta Guna, Sheeta Veerya, and Madhura Vipaka*, is Vata-pittahar-Kaphakar, pacifies the *Pitta dosha*, might have helped in subsiding the symptoms of *Pandu*.²⁶ *Vanshlochan* have *Madhura Kashaya Rasa, Laghu Ruksha Teekshna Guna, Sheeta Veerya, Madhura Vipak, Vata-pittashamak*, have *Deepana, Pachana, Krimighana, Balya, Brihman* properties and works in *Agnimandya, ajeerna, Raktavikara*. *AFL*. Owing to these properties it is useful in diseases of the blood and general debility. Acts as Diuretic, Tonic, Rejuvenator²⁷

Draksha has been mentioned directly in *Roghghanta* of *Pandu*. *Draksha* fruit contains dehydro ascorbic acid i.e., the oxidized form of ascorbic acid, which helps in the absorption of the available iron²⁸. *Draksha* contains Alanine, which is a non-essential amino acid²⁹, that has been shown to help protect cells from being damaged during intense aerobic activity, when the body catabolizes muscle protein to help produce energy this might have reduced the symptom of *Daurbalyata*. Also in *Charaka, Madhu, Yashtimadhu, and Sharkara* are said to be *Shonit sthapak, Pippali* as *Raktavardhak, Draksha* as *Raktaprasadhaka, Amalaki* as *Vayasthapaka*.

CONCLUSION

Pandu is a *Piita Pradhan Tridoshaja Vyadhi*. *Pandu Roga* can be effectively compared with Anaemia on the ground of its similarity in signs, symptoms, complications, and treatment point of view. The study was conducted on 30 patients who were

diagnosed on the basis of signs and symptoms mentioned in *Ayurveda* and the conventional system of medicine. The drug *Amalaki Avleha* was administered for 60 days duration and before and after treatment results were assessed statistically. Most of the ingredients present in *Amalaki avleha* have *Katu* and *Madhura Vipaka, Katu Vipaka* increases the metabolism and *Madhura Vipaka* does the *Dhatu Poshana* and increase the vital strength. It contains well-known *Rasayana* drugs like *Amalaki, and Pippali* that provide adequate nourishment to the *Dhatu* which may improve *Dhatu-shaithilya, Daurbalya, and Ojogunakshaya*. The *Deepana, and Pachana* properties of drugs like *Shunthi, and Pippali* correct *Agnimandya* and alleviate *Ama*, counteracting the poor digestion found in *Pandu Roga*. Thus, breaks the pathogenesis of the disease. *Amalaki* is the main trial compound, it contains a high amount of Vitamin C, which reduces ferric iron to ferrous iron which remains soluble even at neutral pH and is better absorbed. By the end of the study, it was observed that patients tolerated the treatment well with no dropouts and ADR. The results were found to be highly significant for parameters like *Panduta, Agnimandya, Aruchi, Shrama, and Daurbalyata*. Overall, the therapy was found to be effective and the status of patients was said to be improved.

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