



## Clinical Research

## A clinical study of *Punarnava Mandura* in the management of *Pandu Roga* in old age (geriatric anemia)

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### Abstract

**Background:** The incidence of anemia rises with age. The consequences of anemia are many and serious, affecting not only individual's health, but also the development of societies and countries. *Pandu Roga* can be effectively compared with anemia on the ground of its similar signs and symptoms. **Aim:** To evaluate the *Panduhara* and *Rasayana* effect of *Punarnava Mandura* in the management of *Pandu Roga* in old age (geriatric anemia). **Materials and Methods:** The study was conducted in 50 clinically diagnosed patients of geriatric anemia. Patients were treated with *Punarnava Mandura* 2 tablets (250 mg each) twice in a day after lunch and dinner with *Takra* (butter milk) for 90 days. Among 50 registered patients, 40 patients had completed the treatment and 10 patients discontinued the treatment. Results were analyzed using Wilcoxon signed-rank test for subjective parameters and for assessment of objective parameters paired t-test was adopted. **Results:** At the end of study, drug has shown beneficial effect in patients of anemia by providing highly significant result in chief complaints, associated symptoms, *Kshaya* of *Dhatu* and *Agni Bala*, *Deha Bala* and *Sattwa Bala*. It has also improved quality-of-life (QOL) of the patients. Moderate and mild improvement was observed in 30 and 70% of the patients respectively. **Conclusion:** *Punarnava Mandura* may work as *Rasayana* in geriatric anemia by providing highly significant results on clinical features of *Pandu Roga*, *Dehabala*, *Agni Bala* and *Sattwa Bala* and by improving QOL of patients of geriatric anemia.

**Key words:** Anemia, geriatric, *Pandu*, *Punarnava Mandura*

### Introduction

Anemia is common in old age and increases the risk of physical disability, associated with impaired performance and muscle weakness and has been shown to affect older person's physical function.<sup>[1]</sup> Anemia should not be accepted as an inevitable consequence of aging.<sup>[2]</sup> The potential negative impact of a low hemoglobin (Hb) level on performance status, physiology, and functional independence appear to be highest in elderly patients.<sup>[3]</sup>

Acharya Sushruta opines that there is a decline of *Sarva Dhatu* (tissue), *Indriya* (sensory-motor system), *Bala* (strength), *Virya* (virility) after *Sampurnavastha*.<sup>[4]</sup> Acharya Charaka also considered "*Bhrishyamana Dhatu Guna*" (successive decrease in the qualities of *Dhatu*). Thus, it is clear from the Charaka's

view that both qualitative and quantitative decrease in *Dhatu* occurs during old age. *Bhela Samhita* throws further light in this regard. In old age, the capacity for *Viveka* (discretion of assimilated nutrients into *Dhatu*) is hampered due to *Kshaya* of *Dhatu*. Therefore, the replacement of *Dhatu* is also reduced as a result of already existing vitiation.<sup>[5]</sup>

On looking at the ingredients of *Punarnava Mandura*,<sup>[6]</sup> [Table 1], it may work in above context by its effect on *Srotasa* (micro channels) and *Agni* (digestive fire mechanism) by enhancing digestive capacity as a result of their *Deepana* (appetizer), *Pachana* (digestive) properties. Hence, thereby curing the disease (*Pandu*) and promoting immunity of the body in old age.

Considering the above facts that is, higher prevalence of anemia, negative impacts in older individuals, it is important to deal with such type of disease. Further *Punarnava Mandura*, which is considered as an efficacious drug, being successfully prescribed by Ayurvedic physicians for the management of *Pandu* and lot of work have been done on it, but till date no work has been reported in geriatric anemia.<sup>[7-10]</sup>

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**Table 1: Ingredients of *Punarnava Mandura***

Ingredients	Latin name	Proportion
<i>Punarnava</i>	<i>Boerhaavia diffusa</i> Linn.	1 part
<i>Trivrita</i>	<i>Operculina turpethum</i> Linn.	1 part
<i>Shunthi</i>	<i>Zingiber officinale</i> Rosc.	1 part
<i>Maricha</i>	<i>Piper nigrum</i> Linn.	1 part
<i>Pippali</i>	<i>Piper longum</i> Linn.	2 parts
<i>Vidanga</i>	<i>Embalia robusta</i> C. B. Clarke	1 part
<i>Devdaru</i>	<i>Cedrus deodara</i> (Roxb.)	1 part
<i>Kushtha</i>	<i>Saussurea lappa</i> C.B. Clarke	1 part
<i>Haridra</i>	<i>Curcuma longa</i> Linn.	1 part
<i>Daruharidra</i>	<i>Berberis aristata</i> DC.	1 part
<i>Amalaki</i>	<i>Embalica officinalis</i> Gaertn.	1 part
<i>Bibhitaki</i>	<i>Terminalia bellirica</i> Roxb.	1 part
<i>Haritakai</i>	<i>Terminalia chebula</i> Retz.	1 part
<i>Danti</i>	<i>Baliospermum montanum</i> (Willd.)	1 part
<i>Chavya</i>	<i>Piper chaba</i> Hunter.	1 part
<i>Indrayava</i>	<i>Holarrhena antidysenterica</i> (Roxb. ex Flem.) Wall.	1 part
<i>Pippalimula</i>	Root of <i>Piper longum</i> Linn.	1 part
<i>Musta</i>	<i>Cyperus rotundus</i> Linn.	1 part
<i>Chitraka</i>	<i>Plumbago zeylanica</i> Linn.	1 part
<i>Mandura</i>	Incinerated red oxide of iron	40 parts
<i>Bhasma</i>		
<i>Gomutra</i>	Cow's urine	Q.S.

### Aims and objectives

- To evaluate *Panduhara* and *Rasayana* effect of *Punarnava Mandura* on the patients of *Pandu* in old age.

### Materials and Methods

Patients fulfilling the criteria for the diagnosis of the disease were registered for the present study between the age group of 50 and 80 years irrespective of sex, religion, occupation, etc.,. The patients were selected from the outpatient department of Kayachikitsa, Institute for Postgraduate Teaching and Research in Ayurveda, Gujarat Ayurved University, Jamnagar. Out of total 50 selected patients, 40 patients completed, while 10 patients discontinued the treatment due to personal reasons or migration. The study was cleared by the Institutional Ethics Committee vide letter no. PGT/7/Ethics/2009–2010/3494/15 dated 8/2/2010. Informed consent was taken from all the patients before including them in the trial.

### Criteria for selection of patients

#### Inclusion criteria

- Patients between the age group 50 and 80 years
- Patients having cardinal symptoms of *Pandu*, that is., *Panduta* (pallor), *Shrama* (fatigue), *Bhrama* (vertigo), *Pindikodyeshtana* (calf muscle pain), *Daurbalya* (general weakness), *Ayasaja Shwasa* (exertional dyspnoea), etc
- Patients having Hb% below the normal range (in men: 7–13 g/dl and in female: 7–12 g/dl).<sup>[11]</sup>

It is a common perception that Hb level lower than reference values are acceptable in older individuals. However, most

experts recommend using the same reference values for Hb in older persons as are used in younger individuals.<sup>[12]</sup> Hence, in present study same criterion is adopted.

#### Exclusion criteria

- Patients suffering from systemic diseases like diabetes mellitus (DM), renal disorders, heart disease, cancer, acquired immune-deficiency syndrome, tuberculosis, hypertension, and having bleeding disorders
- Patients having anemia due to chronic diseases, including inflammatory disease, malignancy and chronic infection or blood loss
- Age <50 years and more than 80 years
- Hb% level-below 7 g/dl
- Anemia in a case of defective absorption due to gastrectomy, sprue syndrome etc.

Patients were diagnosed and assessed thoroughly on the basis of Ayurvedic classical signs and symptoms of *Pandu* and examined on the basis of specially prepared proforma.

### Laboratory investigations

- Complete hemogram: Hb%, total leucocyte count (TLC), differential leucocyte count (DLC), erythrocyte sedimentation rate (ESR), and packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), platelet count and peripheral smear
- Blood biochemistry: Serum iron, total iron binding capacity (TIBC)
  - Serum glutamic pyruvic transaminase (to rule out liver disease), blood sugar (to rule out DM), blood urea and serum creatinine (to assess the functional status of kidney).
- Urine and stool: Routine and microscopic examination of urine and stool was done to detect presence of any blood, mucus, ova, cyst etc.

These investigations were done in all the patients before treatment and after completion of treatment.

### Criteria for assessment

Assessment was done by considering change in the subjective as well as the objective parameters before the treatment and after the treatment. Patients were assessed clinically every 15 days for evaluation of improvement for a period of 90 days. The changes observed in the signs and symptoms were assessed by adopting suitable scoring method and the objective signs by using appropriate clinical tools.

- Subjective parameters: Signs and symptoms of *Pandu Roga*,<sup>[13]</sup> Symptoms of *Dhatu Kshaya*,<sup>[14]</sup> Scoring of health, wellness and quality of life (QOL) questionnaire,<sup>[15]</sup> Assessment of *Deha Bala*, *Agni Bala* and *Sattwa Bala*<sup>[16]</sup>
- Objective parameters: Hb%, serum iron and TIBC.

### Criteria for the assessment of overall effect of therapy

The total effect of the therapy was assessed as follows:

- Complete remission: 100% relief was considered as complete remission

- Marked improvement: 76–99% relief was considered as markedly improvement
- Moderate improvement: 51–75% relief was considered as markedly improvement
- Mild improvement: 25–50% relief will be considered as markedly improvement
- Unchanged: Below 25% relief was considered as unchanged.

### Follow-up study

After the completion of 90 days of treatment, all the patients were kept under observation for 1-month. During the follow-up study, further improvement or deterioration or no change in the signs and symptoms was recorded.

### Plan of treatment

Patients were given 2 tablets (250 mg each) of *Punarnava Mandura* twice a day after lunch and dinner with the *Anupana* of 100 ml of *Takra* (freshly prepared butter milk) for the duration of 90 days.

### Drug detail

All the raw drugs of *Punarnava Mandura* were procured from Pharmacy, Gujarat Ayurved University, Jamnagar. The correct identity and authenticity of raw materials were confirmed by studying its organoleptic and powder microscopy then comparing them with the characters mentioned in Ayurvedic Pharmacopoeia of India (API). Later, subject experts of Pharmacognosy Department further confirmed identification.

### Statistical analysis

The Wilcoxon signed-rank test is a nonparametric statistical hypothesis test for assessment of subjective parameters.<sup>[17]</sup> To make calculations easy and without manual errors GraphPad InStat 3.06 (Inc, San Diego California, USA) was used. For assessment of objective parameters paired *t*-test was adopted and software used for paired *t*-test was SigmaState 3.5 (SSI, 501, Richmond, CA).

### Observations

Maximum number of patients, that is, 70% belonged to the age group of 50–60 years. Majority of patients, that is, 90% were female, 86% patients were Hindu, 86% were married, 62% patients were housewives, 50% were from poor socioeconomic group. Maximum numbers of patient had *Vata-Pitta Prakriti* (46%) followed by *Pitta-Kapha Prakriti* (34%) and 100% had *Rajasika Sattwika*, *Manasa Prakriti*, *Avara Sattwa* (52%), *Avara Sara* (46%), *Madhyama Samhanana* (52%) and 37.62% patients had attained menopause.

Most of the patients (38%) were found to be indulged in intake of excessive *Amla* (sour) - *Lavana* (salty) *Rasa* (taste), 70% patients were doing intake of less nutritive food, 40% patients were taking food at irregular period as well as in excess or in less quantity than required and 84% patients were addicted to Tea. As per *Viharatmaka Nidana*, *Ati Vyayama* (heavy physical work) was reported in 60%, *Vidagdhe Anne Vyayama* (exercise even before food is not properly digested) in 34%, *Vidagdhe Anne Divaswapna* (sleep even before food is not properly digested) in 32%, *Vegavidharana* (suppression of natural urges) in 72%, *Ratrijagarana* (awakening at night) in 51%, disturbed

sleep (32%) patients were observed. *Manasika Nidana* like *Chinta* (tension) and *Krodha* (anger) were observed in 70% patients and 16% patients had *Shoka* (grief).

In cardinal symptom *Daurbalya* (general weakness), *Panduta* (pallor) and *Hridspandana* (palpitation) were observed in all the patients, that is, 100%, followed by *Shrama* (fatigue) in 98% of patients. *Ayasaja Shwasa* (exertional dyspnoea), *Bhrama* (vertigo), *Aruchi* (loss of appetite) and *Jwara* (fever) were found in 96%, 88%, 70% and 56% respectively. Among associated symptoms all the patients, that is, 100% were *Hataprabha* (lusterlessness). While, *Kati-Pada-Ururuk* (pain in lower limb), *Gaurava* (heaviness) and *Alasya* (lethargy) were noticed in 94%, 82% and 78% of the patients respectively. *Kopanatwa* (irritability) was found in 76% patients. The 54% patients had *Atinidra* (excessive sleep), while 52% patients had complaint of *Karnakshweda* (ringing in the ear). *Sthivana* (excessive salivation) and *Shirnaloma* (hair falling) were noticed in 66% and 40% patients respectively.

Constipation was found in 58% of the patients in present study. 52% of the patients had diminished capacity to ingest the food followed by less appetite (48%). *Rasa Kshaya* and *Majja Kshaya* were found in all the patients. While *Mamsa Kshaya* and *Meda Kshaya* were noticed in 98% and 88% patients respectively. Whereas, *Asthi Kshaya* was found in 84% patients.

Most of the patients, that is, 54% patients had dimorphic anemia and 42% patients had microcytic hypochromic anemia and only 4% had maculo ovulocytic anemia. Moderate pallor of conjunctiva was observed in 40% patients. Whereas moderate pallor of tongue and nail was found in 46% patients. Mild clubbing of nail was noticed in 62% patients of anemia. None of the patients had jaundice.

### Results

*Punarnava Mandura* was found statistically highly significant ( $P < 0.0001$ ) in all chief complaints, that is, *Aruchi* (95.38%), *Daurbalya* (94.59%), *Pindikodwestana* (93.46%), *Jwara* (80%) and *Bhrama* (82.43%) except in *Akshikuta Shotha* (29.63%) in which significant result was noticed [Table 2].

In associate symptoms, therapy showed highly significant decrease in *Alasya* (83.08%), *Atinidra* (75%), *Kopanatwa* (72.73%), *Hataprabha* (27.47%), *Kati-pada-ururuk* (89.89%), *Shirnaloma* (34.38%) and *Sthivana* (33.33%). While in *Shishiradweshi* nonsignificant ( $P = 0.1250$ ) result and in *Karnakshweda* significant relief were observed [Table 3].

Statistically insignificant results were found in hematological parameters that is, Hb%, Total red blood cell (RBC), MCV, MCH, MCHC, PCV, ESR, platelet count and in biochemical parameters that is, serum iron, TIBC, Fasting blood sugar, serum creatinine and blood urea. ESR was decreased by 11.70%. ESR is increased in anemia and decrease in ESR is indicative of improvement in condition of the disease [Table 4].

Study showed highly significant result in *Agni Bala*, *Deha Bala* and *Sattwa Bala* in the patients of *Pandu Roga* in old age [Table 5]. Further *Punarnava Mandura* showed statistically highly significant result in *Kshaya* (decrement) of all *Dhatu*

**Table 2: Effect of therapy on chief complaints on the patients of geriatric anemia**

Criteria	n	Mean		Difference	% of relief	Wilcoxon rank	n	P
		BT	AT					
Aruchi	26	1.62	0.075	1.550	95.38↓	325	25	<0.0001
Akshikutashotha	18	0.67	0.47	0.200	29.63↓	21	6	0.313
Bhrama	36	1.85	0.32	1.525	82.43↓	630	35	<0.0001
Daurbalya	40	2.77	0.15	2.625	94.59↓	820	40	<0.0001
Hridspandana	37	1.85	0.60	1.250	67.57↓	528	32	<0.0001
Jwara	24	0.62	0.07	0.55	88.00↓	153	17	<0.0001
Panduta	40	2.3	2.02	0.275	11.96↓	66	11	0.0010
Pindikodwestana	40	2.67	0.17	2.5	93.46↓	820	40	<0.0001
Shrama	40	2.0	0.62	1.425	69.51↓	703	37	<0.0001
Ayasaja shwasa	39	2.1	0.67	1.425	67.86↓	595	34	<0.0001

BT: Before treatment, AT: After treatment, ↓: Decrease

**Table 3: Effect of therapy on associated symptoms on the patients of geriatric anemia**

Criteria	n	Mean		Difference	% of relief	Wilcoxon rank	n	P
		BT	AT					
Alasya	29	1.62	0.27	1.35	83.08↓	406	28	<0.0001
Atinidra	20	1.1	0.27	0.82	75.00↓	231	21	<0.0001
Kopanatva	32	1.65	0.45	1.2	72.73↓	465	30	<0.0001
Gaurava	31	1.82	0.45	1.37	75.34↓	435	29	<0.0001
Hataprabha	40	2.27	1.65	0.62	27.47↓	253	22	<0.0001
Karnakshweda (ringing)	21	0.65	0.45	0.2	30.77↓	28	7	0.0156
Katipadauru Ruk	40	2.22	0.22	2	89.8↓	780	39	<0.0001
Shirnaloma	19	0.8	0.52	0.27	34.38↓	55	10	0.0020
Shishiradweshi	31	1.02	0.92	0.1	9.76↓	10	4	0.1250
Sthivana	27	0.6	0.4	0.2	33.3↓	36	8	0.0078

BT: Before treatment, AT: After treatment, ↓: Decrease

**Table 4: Effect of therapy on laboratory investigations (n=40)**

Parameters	Mean score		Difference	% of relief	SD	SE	t	P
	BT	AT						
Hb %	10.79	10.91	-0.13	1.16↑	0.61	0.09	1.292	>0.05
TRBC	4.96	5.16	-0.20	4.07↑	1.78	0.28	0.718	>0.05
MCV	84.09	85.61	-1.51	1.79↑	4.47	0.70	2.139	>0.05
MCH	26.69	27.45	-0.77	2.86↑	1.89	0.29	2.555	>0.05
MCHC	31.64	31.98	-0.34	1.06↑	1.19	0.18	1.780	>0.05
PCV	34.06	34.12	-0.05	0.16↑	2.31	0.36	0.150	>0.05
ESR	33	29	4	10.70↓	18.55	2.93	1.201	>0.05
TLC	6233	5915	318	5.09↓	1092	172	1.83	>0.05
Platelet count	269.17	285.77	-16.6	6.16↑	49.54	7.83	2.118	>0.05
S. iron	43.32	42.76	0.56	1.29↓	9.716	1.53	0.362	>0.05
TIBC	380	382	-2	0.57↑	34.40	5.43	0.399	>0.05
SGPT	15	14	0.65	4.42↓	9.40	1.48	0.437	>0.05
S. creatinine	0.91	0.91	0.005	0.54↑	0.17	0.02	0.176	>0.05
Blood urea	26.05	28.42	-2.37	9.11↑	7.72	1.22	1.94	>0.05
Fasting blood sugar	94	92	1.675	1.78↓	9.73	1.53	1.08	>0.05

BT: Before treatment, AT: After treatment, SD: Standard deviation, SE: Standard error, ↑: Increase, ↓: Decrease, TRBC: Total red blood cell, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, PCV: Packed cell volume, ESR: Erythrocyte sedimentation rate, TLC: Total leucocyte count, S. Iron: Serum iron, TIBC: Total iron binding capacity, SGPT: Serum glutamic pyruvic transaminase, Hb: Hemoglobin, S. creatinine: Serum creatinine

except *Rakta Dhātu* in which nonsignificant result was observed [Table 6].

Observing the result of health, wellness and QOL questionnaire, it was found that physical stress and mental stress were

relieved by 27.68–32.50% respectively. Whereas, life enjoyment and overall QOL were improved in 45.45–37.40% of the patients [Table 7].

Study showed highly significant result in all the three types of Pandu i.e. Vatanubandha, Pittanubandha and Kaphanubandha Pandu [Table 8]. Punarnava Mandura provided highly significant result in Kshaya (decrement) of Dhatu except Rakta Dhatu [Table 9].

The overall effect of therapy shows that, maximum numbers of the patients that is, 70% got mild improvement and 30% patients showed moderate improvement. None of the patients remain unchanged. While marked improvement and complete remission was not found in any patient [Figure 1].

## Discussion

There is no direct reference of incidence of Pandu Roga during old age. However, Ayurvedic texts have given comprehensive expression of age related Dhatu Kshaya which establish the prevalence of Pandu Roga in old age. Vata Vriddhi and Dhatu Kshaya in old age, starts a vicious cycle of Pandu, which makes it Kricchasadhya.

Nidana which were observed in maximum patients like awakening at night (51%), heavy physical work (60%), exercise even before food is not properly digested (34%), day sleep even before food is not properly digested (32%), suppression of natural urges (72%), incompatible food (40%), excessive intake

**Table 5: Effect of therapy on Agni Bala, Deha Bala and Sattwa Bala (n=40)**

Criteria	Mean		Difference	% of relief	Wilcoxon rank	n	P
	BT	AT					
Capacity to intake the food	2.07	0	2.07	100↑	378	27	<0.0001
Capacity to digest the food	1.57	0	1.57	100↑	351	26	<0.0001
Liking for food during meal hours	1.52	0	1.52	100↑	474	32	<0.0001
Habit of routine urges especially bowel	1.05	0.12	0.92	88.10↑	325	25	<0.0001
Body strength	2.37	0.3	2.07	87.37↑	820	40	<0.0001
Revitalization of speech and luster	2.22	0.57	1.65	74.16↑	666	36	<0.0001
Feeling of well-being after awakening	1.85	0.2	1.65	89.19↑	528	32	<0.0001
Pathological dreams	1.9	0.32	1.57	82.89↓	595	34	<0.0001
Psychological status	1.3	0.4	0.9	69.23↑	325	25	<0.0001
Proper sleep at time	1.4	0.12	1.27	91.07↑	341	26	<0.0001

BT: Before treatment, AT: After treatment, ↑: Increase, ↓: Decrease

**Table 6: Effect of therapy on Sharira Upachaya (growth of body assessed by weight)**

Parameter	n	Mean			% of change	SD±	SE±	t	P
		BT	AT	Difference					
Sharira Upachaya	40	54.29	54.42	-0.13	0.23↑	0.29	0.04	2.8	<0.01

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

**Table 7 : Effect of therapy on health, wellness and QOL**

QOL questionnaire	n	Mean		Difference	% of relief	Wilcoxon rank	n	P
		BT	AT					
Physical stress	10	1.92	1.39	0.53	27.68↓	55	10	0.0020
Mental stress	10	3.06	2.07	0.99	32.50↓	55	10	0.0020
Life enjoyment	11	1.98	2.88	-0.9	45.45↑	-66	11	0.0010
Over all QOL	14	2.54	3.49	-0.95	37.40↑	-105	14	0.00019

BT: Before treatment, AT: After treatment, ↑: Increase, ↓: Decrease, QOL: Quality of life

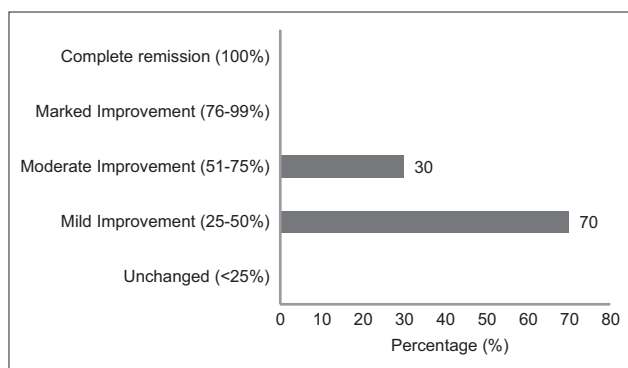
**Table 8: Effect of therapy on Doshanubandha Pandu**

Criteria	n	Mean		Difference	% of relief	Wilcoxon rank	n	P
		BT	AT					
Vatanubandha Pandu	20	16	5.6	10.47	65.00	820	40	<0.0001
Pittanubandha Pandu	15	9.25	2.57	6.67	72.16	820	40	<0.0001
Kaphanubandha Pandu	5	10.7	3.5	7.2	67.29	820	40	<0.0001

BT: Before treatment, AT: After treatment

**Table 9: Effect of therapy on Dhatu Kshaya and Srotas Dushti**

Criteria	n	Mean		Difference	% of relief	Wilcoxon rank	n	P
		BT	AT					
<b>Effect on Dhatu Kshaya</b>								
Rasa	40	4.4	1.82	2.57	58.52	666	36	<0.0001
Rakta	29	1.62	1.4	0.22	13.85	10	4	0.1250
Mamsa	40	3.55	2.12	1.42	40.14	703	37	<0.0001
Meda	37	2.12	1.67	0.45	21.18	105	14	0.0001
Asthi	33	2	1.67	0.32	16.25	55	10	0.0020
Majja	40	5.5	3.22	2.27	41.36	666	36	<0.0001
Shukra	40	3.90	1.92	1.97	50.77	703	37	<0.001
<b>Effect on Srotas Dushti</b>								
Udakavaha	10	3.65	1.77	1.87	51.37	66	11	0.0010
Annavaha	25	3.5	0.12	3.37	96.43	300	24	<0.0001
Mutravaha	2	0.2	0.025	1.17	87.50	3	2	0.5000
Purishvaha	16	3.1	0.57	2.52	81.45	136	16	<0.0001
Swedavaha	19	1.65	1.2	0.45	27.27	36	8	0.078



**Figure 1: Overall effect of therapy on 40 patients of Pandu Roga in old age (geriatric anemia)**

of sour-salt dominant diet (38%), low nutritive diet (70%) and addiction to tea (84%), tension (70%), anger (70%) play a major role in etiopathogenesis of Pandu during old age.

In the present study, majority of the patients that is 90% were female. A study also reveals the same fact that under age 75 years, anemia is more common in females.<sup>[18]</sup> Most of the patients were having Pitta-Vata and Pitta-Kapha Prakriti, so it may be inferred that persons with Pitta dominance may suffer from Pandu Roga more frequently than that of Vata or Kapha dominance and it may be recommended for the persons of Pitta dominance that to avoid disease like Pandu Roga they should have to keep away from Pitta vitiating factors.

It was observed that constipation was found in 58%, it may be due to reduced peristalsis of the colon in old age.<sup>[19]</sup> Microcytic hypochromic anemia that is iron deficiency anemia was found in 42% of the patients, which is supported by the fact that iron deficiency occurs in approximately 15-30% of elderly anemic patients.<sup>[20]</sup>

Maximum patients had diminished intake of food and impaired digestion, this signifies the disturbance of Agni that is Mandagni, it results into improper formation of Rasa

Dhatu and subsequently Rakta Dhatu etc., also. Rajasika Sattwika Prakriti and Avara Sattwa were found in 100 and 52% patients respectively. These patients are more prone to tension, anger and disturbed sleep. Disturbance in Manasika Bhavas that is tension and anger etc., lead to improper digestion of food even after the taken diet is in proper quality and easily digestible.<sup>[21]</sup> Subsequently it results into improper formation of further Dhatus and produce disease.

Daurbalya and Ayasaja Shwasa (exertional dyspnoea) were found in 100% and 96% respectively. In anemia oxygen carrying capacity of RBC is diminished due to reduction in MCH and MCV. Hence, to supply the required amount of oxygen according to the tissue demand, heart has to do more work, so heart rate increases, tachycardia and palpitation occurs and respiratory rate also increases accordingly, and patients feel exertional dyspnoea.<sup>[22]</sup>

Improvement in Aruchi was 95%, may be due to appetizer, digestive, hepatoprotective properties of Trikatu,<sup>[23]</sup> Chitraka, Vidanga etc.<sup>[24]</sup>

Therapy showed highly significant result in all the parameters that is physical stress, mental stress, life enjoyment and overall QOL of health, Wellness and QOL questionnaire. It may be achieved due to antioxidant and immune modulator ingredients of Punarnava Mandura.

Statistically highly significant result was observed in Kshaya (decrement) of Dhatu except Rakta Dhatu. Rasayana drugs bear the property of antioxidant and work as free radical scavengers and thus beneficial in decrement of Dhatu found in geriatric anemia. Therapy showed highly significant result in Udakavaha, Annavaaha, Purishavaha and Swedavaha Srotas Dushti [Table 9].

In assessment of Agni Bala, 100% improvement was noted in capacity to digest the food, capacity to intake the food and liking for food during meal hours, which may be due to appetizer, digestive and carminative properties of the drug. While 88.10% improvement was noted in habit of routine urges especially bowel [Table 5].

Vata Dosha plays crucial role in manifestation of Pandu Roga mainly Vyana Vayu has a relation with pathogenesis of Pandu Roga.<sup>[25]</sup> During old age the diminution of the Dhātu occurs with dominance of Vata Dosha.<sup>[26]</sup> It results in diminished function of the digestion and metabolism in old age. Further it results in improper production of consequent Rasa, Rakta etc., These can be counteracted by Punarnava Mandura which contains appetizer, digestive and immunomodulator drugs.

In assessment of Sattwa Bala, statistically highly significant improvement was found in feeling of wellbeing after awakening, pathological dreams and psychological status of patient and proper sleep at time in 89.19%, 82.89%, 69.23%, 91.07% respectively. While assessing Deha Bala, physical strength, revitalization of speech and luster and growth of body assessed by weight were improved in 87.37%, 74.16% and 0.23% of the patients respectively [Tables 5 and 6].

### Probable mode of action

According to Ayurvedic literature, most of the drugs in Punarnava Mandura that is Triphala,<sup>[27]</sup> Trikatu,<sup>[28]</sup> Chitraka,<sup>[29]</sup> Vidanga<sup>[30]</sup> and Pippalimula<sup>[31]</sup> are having appetizer, digestive and carminative properties. Hence it improves digestive power and ultimately absorption of nutrition and drug also. The components like Trivrita,<sup>[32]</sup> Haritaki<sup>[33]</sup> and Danti<sup>[34]</sup> act as purgative/laxative which help in relieving constipation mainly found in old age. Haridra,<sup>[35]</sup> Amalaki,<sup>[36]</sup> Pippali,<sup>[37]</sup> Punarnava<sup>[38]</sup> and Trivrita<sup>[39]</sup> are thought to be Panduhara by various Acharyas. Other drugs that is Amalaki,<sup>[40]</sup> Danti,<sup>[41]</sup> Pippali,<sup>[42]</sup> Punarnava,<sup>[43]</sup> Kushtha<sup>[44]</sup> and Daruharidra<sup>[45]</sup> are documented as drugs which are having immunomodulator and antioxidant properties. Hence, they may have the potential to confer beneficial health effects due to their antioxidant activity and thus useful in geriatric anemia.

Amalaki possess antioxidant activity and could be an important dietary source of Vitamin C, which is a powerful water-soluble antioxidant<sup>[46]</sup> and helps in increasing iron absorption from the gut.<sup>[47]</sup> One study on Pippali suggests that, piperine gets absorbed very quickly across the intestinal barrier through the intracellular pathway. It may modulate membrane dynamics due to its easy partitioning thus helping in efficient permeability across the barriers.<sup>[48]</sup> In addition Pippali is said to be bio-availability enhancer of the drug,<sup>[49]</sup> which further helps in easy assimilation of the drug components. Hence, it counteracts poor digestion and absorption usually reported in patients of geriatric anemia. It has also immunomodulator activity.<sup>[50]</sup> Therefore it improves general health and immunity vigor, luster of the skin etc., in patients having anemia.

Mandura Bhasma (incinerate form of iron-Fe<sub>2</sub>O<sub>3</sub>), the main component is the activator of the formulation and is the chief responsible component for the pharmacodynamics of Punarnava Mandura. By virtue of Rasa and Guna it pacifies aggravated Pitta and maintains the normalcy, improves the digestion and metabolism. Looking in to the diversified actions, Acharya Charaka says that, Mandura and its preparations are vital in treating cases of Pandu. The ferric and ferrous fractions of Mandura provide sufficient amount of iron to the living matter, which is needed for normal erythropoiesis.<sup>[51]</sup>

As Gomutra (Cow's urine) is one ingredient of Punarnava Mandura, it works as Rasayana by its antioxidant property. It

has been found to be a very good immune enhancer.<sup>[52]</sup> Presence of erythropoietin hormone in Cow's urine may be one of the reasons why Gomutra is useful in anemia. Iron present in Cow's urine maintains balance and helps in production of red blood cells and Hb.<sup>[53]</sup>

Further, the activity of Punarnava Mandura gets potentiated as it is to be administered with Takra (butter milk) as an adjuvant of which have therapeutic attributes Agnideepana (appetizer) and Panduhara (anti anemic) properties.<sup>[54]</sup>

### Conclusion

Punarnava Mandura is a unique poly herbo mineral formulation which may work as a Panduhara and Rasayana in the patients of geriatric anemia and can counteract most of the pathological manifestations related to Pandu Roga in old age (geriatric anemia).

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## हिन्दी सारांश

### पुनर्नवा मण्डूर का वृद्धावस्थाजन्य पाण्डु पर चिकित्सात्मक अध्ययन

मेघा जी. पण्ड्या, अलंकृता आर. दवे

उम्र बढ़ने के साथ पाण्डुरोग होने की संभावना भी बढ़ती जाती है। पाण्डुरोग के लक्षण एनीमीया के समकक्ष होने से उसकी एनीमीया के साथ तुलना कि जा सकती है। प्रस्तुत चिकित्सात्मक अध्ययन के लिए वृद्धावस्था जन्य पाण्डुरोग के ५० आतुरों का चयन किया गया। इस अध्ययन का मुख्य उद्देश्य विभिन्न वैज्ञानिक मापदण्डों के आधार पर वृद्धावस्थाजन्य पाण्डुरोग की चिकित्सा में पुनर्नवामण्डूर के पाण्डुहर और रसायन प्रभावों का अध्ययन करना है। आतुरों को पुनर्नवा मण्डूर की २ गोली (२५० मि.ग्रा.) दिन में दो बार भोजन पश्चात तक्र के साथ ९० दिन तक दी गई। चयन किए गए ५० आतुरों में से ४० आतुरों ने चिकित्सा अवधि पूर्ण की। महत्तम आतुरों को (७०%) अल्प लाभ और ३०% आतुरों को मध्यम लाभ प्राप्त हुआ। इसके अतिरिक्त पाण्डुरोग के प्रधान लक्षण, सहायक लक्षण, धातुक्षय और आतुरों के अग्निबल, सत्वबल पर भी अच्छा परिणाम प्राप्त हुआ। प्राप्त परिणामों से यह सिद्ध हुआ कि, पुनर्नवामण्डूर वृद्धावस्था जन्य पाण्डुरोग में लाभकारी है।