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# ROLE OF RAKTABASTI IN PANDU (MYCROCYTIC HYPOCROMIC ANEMIA)

**Dr. Abhijit Dinkarrao Shekhar***

Lecturer in D.Y. Patil College of Ayurveda and Research Centre Pimpri Pune.

***Corresponding Author: Dr. Abhijit Dinkarrao Shekhar**

Lecturer in D.Y. Patil College of Ayurveda and Research Centre Pimpri Pune.

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## ABSRACT

A prominent diagnostic feature of *Pandu roga*[1] is the pallor on the skin which occurs due to the quantitative and qualitative deficiency of *raktu dhatu* (~blood tissue) caused either in the form of deficiency of hemoglobin and/ or red blood cells (RBCs). Considering *Panduta* (pallor) as the predominant sign, the disease is termed as *Pandu roga*. The nearest correlation of iron deficiency anemia (IDA) can be made with *Pandu roga*, because of the predominance of *Panduta* or pallor in the whole body. Iron deficiency is a very common nutritional disorder worldwide and is known to affect approximately one third of the global population. While its incidence in affluent countries is low, the incidence of IDA in India is very high. According to National Family Health Survey (NFHS) III data, the incidence of anemia in urban children is 71%, rural is 84%, and overall is 79%. Nutritional iron deficiency is the most common cause of anemia in India. IDA is a very common disease prevalent in the society and side effects of oral allopathic iron preparations are very frequently encountered. With the aim that herbal and aja rakta may be effective to manage IDA without any side effects, the present study was carried out to study the efficacy of and *darbha*[1] *and aja rakta*[1] with the application of modern parameters.

**KEYWORDS:** *Pandu, Darbha,*[1] *Aja Rakta.*[1]

## MATERIALS AND METHODS

### Study design

A randomized, single-blind controlled clinical study was conducted in patients suffering from IDA.

### Selection of cases

For the study the patients having the clinical features of *Pandu roga* (IDA) were selected.

### Inclusion criteria

- Patients of either sex from age 12 to 60 years
- Patients with hemoglobin level 6 to 11 g/dL.
- Microcytic hypochromic anemia on peripheral blood smears (PBSs).

After obtaining written informed consent from patients of both sexes with hemoglobin level below normal range and PBS showing microcytosis and hypochromia were included.

### Exclusion criteria

- Blood Hb less than 6 g/dL
- Patient having occult blood positive on stool examination
- Any other type of anemia except IDA
- IDA with any associated severe complication.

### Discontinuation criteria

- Blood hemoglobin level becomes less than 5 g/dL during the course of treatment
- Any other acute illness
- Patients not willing to continue
- Any severe untoward effects.

### Selection of drug

*Darbha and Aja Rakta – Basti* is an *Ayurvedic* formulation quoted in *Charak samhita* for the treatment of *Pandu roga*. The formulation was modified to make it in form for easy administration to patients.

### Procurement of the drug

*Aja Rakta* should be taken in fresh form 50 ml and *Darbha* 5 g should be added. This formulation should be given in form of *Basti* daily for 7 days. Follow up on 0, $4^{th}$, $8^{th}$ day.

### Analytical study of trial drug

The trial drug sample was subjected to various physiochemical analytical tests to evaluate the standards of drug. Analytical test reports of the trial drug are as follows:

*DARBHA*-Imperata cylindrical.
Family-Gramineae.
Chemical gradient-Tripernoids arundoin.(anticoagulant)
*AJA RAKTA*- Colour- Brownish red

Odour- *Loha gandha* pH-7.431
sr.iron level-69(60-160ug/dl TIBC-375(250-400ug/dl) s.feritin
V.D.R.L.- Negative
HIV TEST – Negative

**Schedule of treatment**
Deworming was done before drug therapy. Cases registered for the study were randomly selected into single group.

Dose of formulation: Aja rakta 50ml + 5g *Darbha*
Duration of treatment: 7 days.
Diet: Normal diet was advised to all the cases according to age.
Follow ups were done 0, 4$^{th}$, 8$^{th}$ day.

**Laboratory investigations**
- Total CBC count will be done before and after treatment but HB % is main criteria.

**Assessment criteria**
The results of the clinical study were assessed on the basis of observations of clinical features and laboratory findings. The following parameters were mainly adopted for assessing the response of the treatment.

**Clinical assessment**
The following clinical findings were assessed before, during, and after the treatment:
*Vaivarnata/Panduta (pallor), Rukshata (dryness), Angmard (bodyache), Daurbalyata (weakness), Shrama/Balakshay (fatigue), Shwasa (dyspnea), and Shotha/Shofa (edema)*

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

**Grading of clinical features**

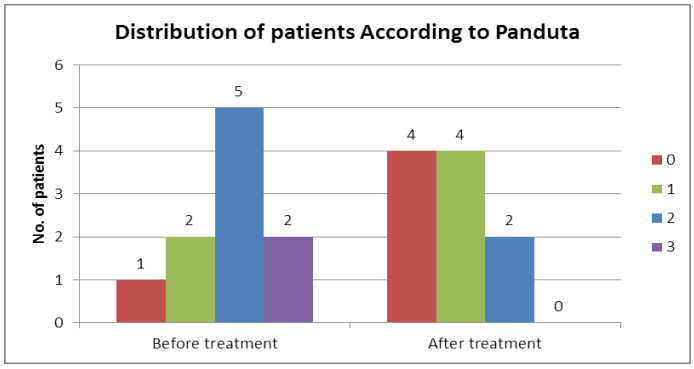
| | **No/ Absent 0** | **Mild 1** | **Moderate 2** | **Severe 3** |
|---|---|---|---|---|
| *panduta (Pallor)* | Absent | Pallor of conjunctivaand mucus membrane | Pallor of conjunctiva Mucus, membrane Plus, skin | Pallor of conjunctiva, mucus membrane, skin plus, palmer creases |
| *Rukshata (Dry skin)* | Absent | Not seen but felt by touch | Stretching of skin that person feel | Visible dryness |
| *Angamarda (Bodyache) VAS Scale* | Absent | 0 to 4 (Annoying) | 4 to 6 (Uncomfortable) | 6 to 10 (Dreadful, Horrible, Agonizing) |
| *Balakshaya (Fatigue)* | Sit up in 5 min. | More than 30 | 21-30 | 11-20 |
| *Shofa (Edema* | No | Pitting edema 1cm over ankle joint | Pitting edema 2cm above from ankle joint | Pitting edema more than 2cm above from ankle joint. |
| *Shwaas krichhata (dyspnoea on exertion)* | dyspnoea | Climbing of one staircase | Climbing of 2$^{nd}$ staircase | Dyspnoea on rest. |

**Statistical analysis of different parameters**
Observations documented during the study were analyzed and finding were evaluated by using statistical methods wilcoxon signed statistic test.

**1. *Panduta***
**Reduction in Panduta.**

| **Panduta** | **Median** | **Mean Score** | **Percent Improvement in mean** | **Sample size** | **Wilcoxonsigned rank Statistic ($T^+$)** | **p-value (test)** |
|---|---|---|---|---|---|---|
| Before treatment | 2 | 1.8 | 55.56% | 10 | 45 | 0.0047 |
| After treatment | 1 | 0.8 | | | | |

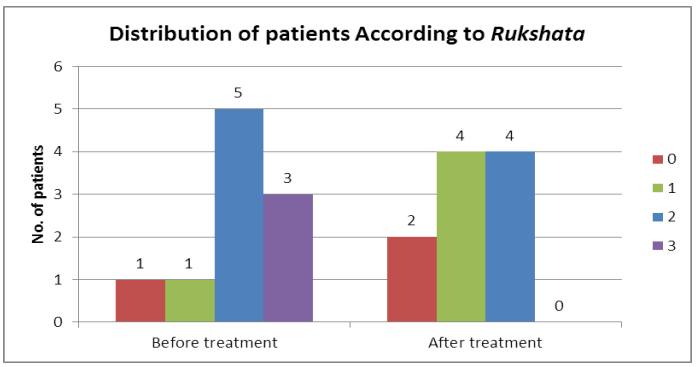
Using Wilcoxon signed rank test for *Panduta*, p – value is less than 0.05 i.e. the median difference between degree of Panduta before treatment and after treatment is significantly higher at 5% significance. i.e. we can say that there is significant reduction in Panduta.




**2. *Rukshata***
**Reduction in Rukshata**

| Rukshata | Median | Mean score | Percent Improvement in mean | Sample size | Wilcoxon signed rank Statistic ($T^+$) | p-value (test) |
|---|---|---|---|---|---|---|
| Before treatment | 2 | 2 | 40% | 10 | 36 | 0.0059 |
| After treatment | 1 | 1.2 | | | | |

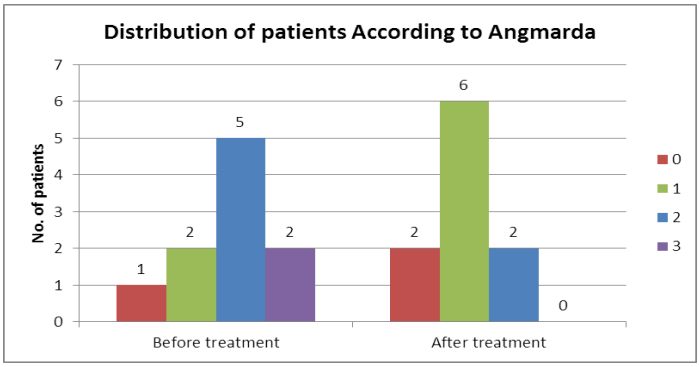
Using Wilcoxon signed rank test for *Rukshata*, p – value is less than 0.05 i.e. the median difference between degree of Rukshata before treatment and after treatment is significantly higher at 5% significance. i.e. we can say that there is significant reduction in Rukshata.




**3. *Angamarda***
**Reduction in *Angamarda***

| Angamarda | Median | Mean score | Percent Improvement in mean | Sample size | Wilcoxonsigned rank Statistic ($T^+$) | p-value (test) |
|---|---|---|---|---|---|---|
| Before treatment | 2 | 1.8 | 44.44% | 10 | 28 | 0.015 |
| After treatment | 1 | 1 | | | | |

Using Wilcoxon signed rank test for *Angamarda*, p – value is less than 0.05 i.e. the median difference between degree of Angamarda before treatment and after treatment is significantly higher at 5% significance. i.e. we can say that there is significant reduction in *Angamarda.*

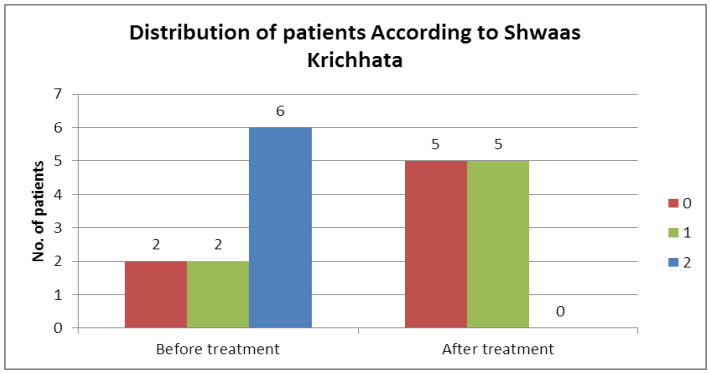


**4. Shwaas Krichhata**

**Reduction in Shwaas Krichhata.**

| Shwaas Krichhata | Median | Mean score | Percent Improvement in mean | Sample size | Wilcoxonsigned rank Statistic ($T^+$) | p-value (test) |
|---|---|---|---|---|---|---|
| Before treatment | 2 | 1.4 | 64.29% | 10 | 36 | 0.0083 |
| After treatment | 0.5 | 0.5 | | | | |

Using Wilcoxon signed rank test for Shwaas Krichhata, p – value is less than 0.05 i.e. the median difference between degree of Shwaas Krichhata before treatment and after treatment is significantly higher at 5% significance. i.e. we can say that there is significant reduction in Shwaas Krichhata.

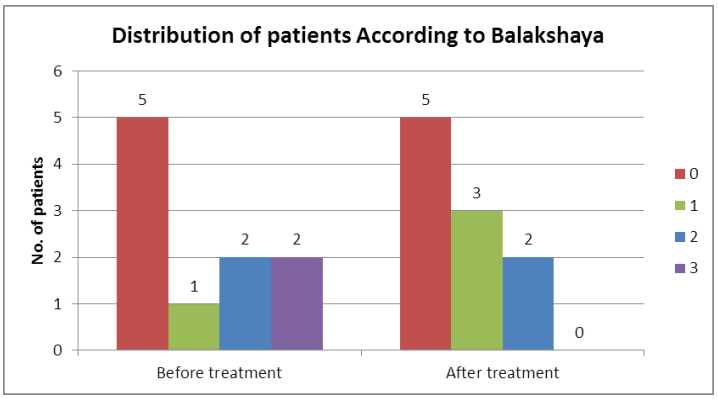



**5. Balakshaya**

**Reduction in Balakshaya**

| Balakshaya | Median | Mean score | Percent Improvement in mean | Sample size | Wilcoxonsigned rank Statistic ($T^+$) | p-value (test) |
|---|---|---|---|---|---|---|
| Before treatment | 0.5 | 1.1 | 36.36% | 10 | 6 | 0.174 |
| After treatment | 0.5 | 0.7 | | | | |

Using Wilcoxon signed rank test for Balakshaya, p – value = 0.174 i.e. the median difference between degree of Balakshaya before treatment and after treatment isn't significant at 5% level of significance. i.e. we can say that there isn't any significant reduction in Balakshaya.

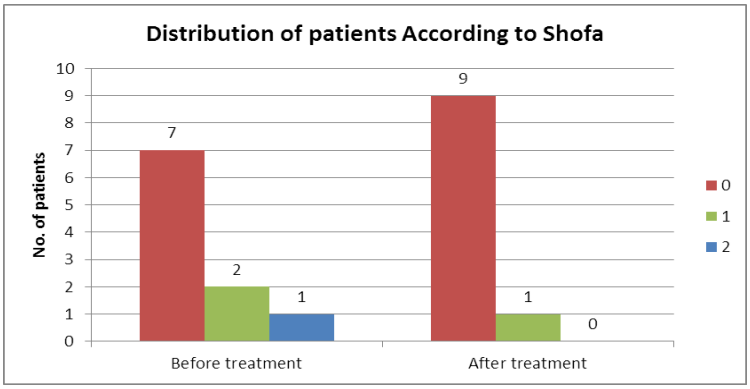



**6. Shofa**

**Reduction in Shofa**

| Shofa | Median | Mean score | Percent Improvement in mean | Sample size | Wilcoxonsigned rank Statistic ($T^+$) | p-value (test) |
|---|---|---|---|---|---|---|
| Before treatment | 0 | 0.4 | 75% | 10 | 6 | 0.149 |
| After treatment | 0 | 0.1 | | | | |

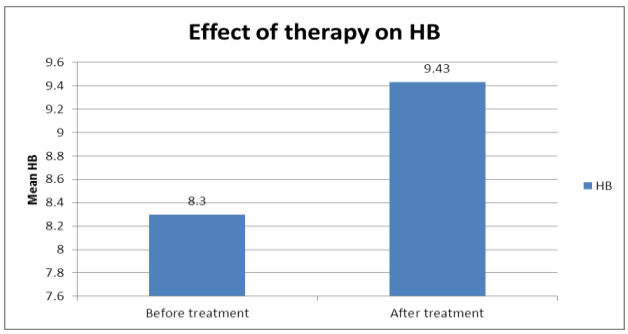
Using Wilcoxon signed rank test for Shofa, p – value = 0.149 i.e. the median difference between degree of Shofa before treatment and after treatment isn't significant at 5% level of significance. i.e. we can say that there isn't any significant reduction in Shofa.




**7. HB**

| Parameter | Mean | | | | n | d.f | SE (±) | "t" | "p" |
|---|---|---|---|---|---|---|---|---|---|
| | B.T. | A.T | Diff. | improvement | | | | | |
| HB | 8.3 | 9.43 | 1.13 | 13.61% | 10 | 9 | 0.113 | -10.036 | < 0.01 |

Using paired t test, for HB, p – value is less than 0.01 i.e. the difference between mean HB before and after treatment is significant at 5% level of significance. i.e. we can say that there is significant improvement in HB.




**Overall Effect of Therapy**

| No. | Parameter | Category of Improvement |
|---|---|---|
| 1 | Panduta | Significant |
| 2 | Rukshata | Significant |
| 3 | Angamarda | Significant |
| 4 | Shwaas krichhata | Significant |
| 5 | Balakshaya | Non – Significant |
| 6 | Shofa | Non – Significant |
| 7 | HB | Significant |

Considering overall effect, significant improvement in 71.43% parameters (5 out of 7) of sign and symptoms was the drug can be considered as moderately effective (50% - 75% improvement) in treatment of Pandu.

## OBSERVATIONS AND RESULTS

Total 10 patients of *Pandu roga* (IDA) were registered in the clinical study and randomly selected.On the observation of age wise distribution of 10 patients of *Pandu roga.* i.e. The maximum number of patients in this study, were 2 patients from age group 25-35 and 45-55 yrs each. (20% from each group) while 6 patients were from age group 35-45 yrs. (60%). Out of 10 patients, 2 patients (20%) were Male while remaining 8 (80%) were Female. Out of 10 patients, 3 patients were housewives (30%). 5 out of 10 (50%) patients were worker while 2 were in service (20%).

Out of 10 patients, 3 patients (30%) were Veg while remaining 7 (70%) were having Mix diet.

Maximum patients were from Vata - Pitta Prakruti. i.e. 6 patients(60%.) followed by 3 patients of Vata – Kapha prakruti (30%). There was only 1 patient was observed to be having Pitta – Vata prakruti (10%).

3 patients were having visham agni (30%) and 2 were having Tikshan agni (20%). Maximum no of patients i.e. 5 were having Mand agni (50%) (The term koshtha implies the inherent condition of the digestive system. *Mridu koshtha* ~highly sensitive to laxative substances, *Madhya koshtha* ~ moderately sensitive and krura koshtha ~ very less sensitivity to laxative substances.)

After treatment, the trial group showed 89.29% relief in pica, whereas the placebo group perceived 61.54% relief. The study shows that *Rakta basti* can be considered to be effective for the correction of microcytic and hypochromic anemia.

All the patients were examined on $4^{th}$ and $8^{th}$ day for evaluation of any adverse drug reaction. It was found that the drug "*Rakta basti*" had no noticeable side effect. The drug was tolerated well and not a single patient exhibited any adverse symptom.

## DISCUSSION

Though every age group is susceptible to the affliction of *Pandu roga*, it is more common in small children due to the intake of iron deficient diet or less iron content in diet. Families of poor income group are unable to afford proper diet and due to improper and imbalanced diet, children of those families may get the disease. As per the

WHO report iron deficiency is most common among groups of low socioeconomic status. The disease *Pandu roga* is equally prevalent in both vegetarians and nonvegetarians. The disease is more prevalent in the children having the Prakriti dominant in Pitta. As *Pandu roga* is Pitta dominant tridoshaja vikara (~ disease caused due to anomalous behaviour of all the three doshas) and undernutrition is commonly found in Vata dominant persons so probably this might be the reason of majority of patients being of *Vata-Pitta* Prakriti group in the present study. *Mandagni* and *Madhyam koshtha* are observed in maximum patients. Consuming insufficient diet due to *Mandagni* leads to malnutrition, the root cause of disease. According to Ayurveda abnormal function of Agni is the root cause of all diseases. *Madhyam Koshtha* showing dominance of *Kapha* leads to improper digestion, which is the important cause of any disease. *Kapha Dosha* is predominant during childhood period and *kapha dosha* also plays an important role in the pathogenesis of the disease. After 7 days treatment with the trial drug, highly significant improvement was observed in the clinical features of IDA with P value < 0.001. After 4th and 8th day of medication with *rakta basti* comparatively faster improvements were observed in the clinical features such as pallor, anorexia, weakness, fatigue, and so on above tables. Clinical features of *Pandu roga* (~IDA) are mainly due to quantitative and qualitative reduction of Hb and less oxygen supply in the tissues. 1 g% hemoglobin, when fully saturated, combines with 1.34 mL of oxygen, therefore, hemoglobin concentration is an index of oxygen carrying capacity of blood. With the trial drug therapy hemoglobin status improves, body tissues get adequate oxygen, body metabolism improves, and ultimately relief in clinical symptoms is observed.

The present clinical study shows the hematinic potential of. Rakta basti It is evident that the treatment of iron deficiency anemia with Rakta basti shows statistically significant increase of hematologic values, such as blood Hb%, total RBC, PCV, MCV, MCH, MCHC, and so on. Blood hemoglobin level was improved significantly with a mean increase of 1.13 g/dL in 7 days (8.3-9.43 g/dL, *P* <0.001) Hb was increased by 13.61%. [Table 5] and [Table 6] shows non significant statistical analysis.

Rakta basti is more effective for the correction of eating disorder pica. Females especially those who are underfed and anemic are commonly affected with pica. As per modern text, iron deficiency is definitely responsible for pica in a large number of children and females habit usually abates with iron therapy.

The trial drug was subjected to test for iron. As per analytical study reports the present trial drug contains 1.049 mg elemental iron per milliliter of the suspension. It contains mainly ferric iron and also ferrous iron, but in smaller quantities. Iron oxides, iron sulfide, and iron manganese hydroxide have been found to be present in the trial drug. Normally iron is recommended in the dose of 4-6 mg (elemental iron) per kg of body weight per day in divided doses. In the present clinical study the trial drug was administered in the dose of 50 ml per day. Absorption of ferrous form of iron is more than ferric iron. But the present trial drug contains more amount of ferric iron than ferrous iron. Ferric iron can be converted in the presence of intestinal mucosa by ferric reductase in the intestinal brush border to ferrous iron. *Rakta basti of aja with darbha* is an Ayurvedic formulation. The trial drug contains herbal drugs like Darbha, which is best anticoagulant property and along with blood through anal route absorption by rectal mucosa takes place.

## CONCLUSION

Raktabasti has been subjected to a clinical study on patients suffering from IDA. It contains iron and herbal ingredients (*darbha*). Herbal ingredients and aja rakta present in the trial drug may increase the bioavailability of iron. Hematinic action of may be due to the presence of iron contents of good bioavailability. The present clinical study clearly indicates that the formulation Aja rakta and darbha in basti form is an effective, well-tolerated, and clinically safe formulation for the management of IDA in patients.

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