An Observational Study of Rakta Kshaya Lakshana in Pandu

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Abstract: *Pandu Roga*, described in Ayurveda as a disorder of Rasadhatu and Raktadhatu depletion, closely resembles anemia in modern medicine, particularly iron-deficiency anemia. This observational study aimed to examine the Rakta Kshaya Lakshanas in 200 patients and correlate classical Ayurvedic features with hematological parameters. Patients were diagnosed and registered based on classical signs and types of Pandu, and data were systematically recorded, coded, and analyzed using descriptive statistics, Chi-square, and Kruskal–Wallis tests. The study revealed a higher prevalence among middle-aged individuals (41–50 years, 29%) and females (72%), reflecting the cumulative effects of dietary inadequacy, Agnimandya (weakened digestive fire), and reproductive blood loss through menstruation, pregnancy, and childbirth. Married women and daily wage laborers constituted the majority, highlighting the role of life-stage and occupational stress as predisposing factors. Low educational status (37% illiterate) and positive family history (58%) were significantly associated with Pandu, suggesting the influence of health literacy, hereditary predisposition, and shared nutritional habits. Habitual factors, including regular tea consumption (51%) and constipation (60.5%), further contributed to impaired Rasa–Rakta formation by inhibiting iron absorption and weakening Agni, respectively. Tongue examination commonly showed Shushka + Khara (34.5%) and Sweta Lipta (30%), while subjective symptoms such as Amla ichha (69%), Shira Saithilya (79.5%), and Rukshta (73.5%) reflected Vata aggravation and Dhatu depletion. Hemoglobin analysis demonstrated that 80% of patients had Hb <11 g/dL, confirming moderate anemia. The study illustrates the principle of karya–karana bhaava, linking etiological factors—nutritional deficiency, excessive physical labor, reproductive blood loss, and lifestyle habits—to the manifestation of Pandu. Integrative interpretation supports a multidimensional management strategy combining Ayurvedic measures (Agni strengthening, Pathya ahara, Rasayana therapy, postnatal care) with modern interventions (iron-folic supplementation, nutritional education, and deworming). These findings reinforce the relevance of classical Ayurvedic diagnostic criteria in identifying anemia and emphasize the importance of addressing both causative factors and clinical manifestations to prevent and manage Pandu effectively.

Keywords: Amla sheeshira Preeti, Rakta kshaya, Dhatu-Vaishamya, Anemia, Pandu.

INTRODUCTION

Ayurveda regards Rakta, the blood tissue, as one of the seven essential *dhatus* that sustain life. The well-being of every other *dhatu*—from *rasa* to *shukra*—ultimately depends on the vitality of *rakta*. When this vital tissue is diminished, a state known as *Rakta Kshaya*, the body does not remain silent. It tries to protect itself, displaying early warning signs called *Rakta Kshaya Lakshana*. *Sushruta Samhita* describes how, during such depletion, the body develops natural cravings for specific tastes (*rasa*), qualities (*guna*), potencies (*virya*), and post-digestive effects (*vipaka*). If these instinctive demands are honoured—by choosing foods and lifestyles that match the body's needs—the lost balance of *dhatu* can often be restored. Among the disorders that involve *Rakta*, Pandu Roga occupies a special place. The very word *pandu* is derived from the root *padi nashane dhatu* with the suffix *ku*, which conveys the idea   loss or diminution. Ancient commentators interpret this loss primarily as a change in colour—*varna*—and use the term *vaivarnya* to denote the fading of the body's natural complexion. *Charaka Samhita* describes the skin of a person with *pandu* as resembling the yellow of turmeric or showing a faint greenish hue. *Sushruta* similarly observes a whitish or pale-yellow tinge throughout the body. Classical scholars such as Chakrapani and Dalhana explain *pandu* with words like *shweta* (white), *dhusara* (greyish), and *pitavabhasa* (yellowish), all pointing to this characteristic loss of colour and vitality.

Ayurvedic physicians further classify into five varieties—*Vataja*, *Pittaja*, *Kaphaja*, *Sannipataja*, and *Mridbhakshanjanya*. Each type reflects a unique pattern of *dosha* involvement and presents slightly different clinical features. Despite these differences, the overall picture is strikingly similar: the patient appears pale and lifeless, complains of fatigue and heaviness, and feels a gradual weakening of strength and tissue tone, a state described as *shithilendriya*—a slackening of the body's natural resilience.

Modern medicine offers a closely parallel description in its understanding of anaemia. Anaemia is defined as a quantitative or morphological deficiency of red blood cells or haemoglobin, leading to a reduced ability of the blood to carry oxygen. It can arise in several ways: through actual blood loss—whether from trauma, gastrointestinal bleeding, or other haemorrhagic conditions; through reduced production of red cells caused by iron or vitamin B_{12} deficiency, bone-marrow disorders, or genetic conditions such as thalassemia; or through increased destruction of red cells, as occurs in haemolytic anaemias, malaria, and certain autoimmune diseases. The outward signs—pallor, tiredness, breathlessness, diminished physical strength—echo the classical symptoms of described thousands of years earlier.

Ayurvedic literature also highlights how diet and lifestyle (*ahara* and *vihara*) influence this condition. Food suited to one's constitution (*prakriti*), season, and habitat provides the subtle nutritive essence called *sarabhaga*, which in turn nourishes each *dhatu—rasa*, *rakta*, *mamsa*, and beyond. When this delicate chain of nourishment is disrupted, *rakta* suffers first, and the signs of *pandu* emerge. Early in the process, the body often signals its need for correction by craving foods of a particular taste or temperature—seeking warmth when *vata* rises, for example, or coolness when *pitta* predominates. Recognising and responding to these cues is considered essential for restoring balance.

Viewed in this light, can be appreciated as more than a mere loss of colour. It represents a profound disturbance of nourishment and vitality—one that Ayurveda observed with remarkable precision and that modern haematology now describes in biochemical terms. Understanding these ancient insights alongside contemporary science helps illuminate both the timeless wisdom of Ayurveda and the continuing relevance of its clinical observations.

DISCUSSION

Pandu Roga, as delineated in Ayurveda, is characterized by the depletion of Rasa dhatu and Rakta dhatu, manifesting through symptoms such as Panduta (pallor), Daurbalya (weakness), Hrid-drava (palpitation), and various other Lakshanas. These manifestations bear a striking resemblance to the clinical presentation of iron-deficiency anemia in modern medicine. In this observational study of 200 patients, both objective and subjective signs of Rakta Kshaya Lakshanas were documented and correlated with hematological parameters. Each observed feature reflects a clear cause–effect relationship (karya–karana bhāva), allowing interpretation through classical Ayurvedic concepts as well as modern biomedical perspectives.

The age-wise distribution revealed that most patients were in the 41–50 year age group, followed by individuals in their twenties. Ayurveda explains that Madhyama avastha (middle age) is the stage when cumulative effects of dietary indiscretion, Agnimandya (weakened digestive fire), and gradual depletion of Rasa and Rakta dhatus manifest clinically. Prolonged exposure to etiological factors such as Alpa Ahara (insufficient intake), Viruddha Ahara (incompatible foods), chronic stress, and irregular meals deranges Pitta and Vata doshas, weakening Rasagni and impairing Rakta formation. From a modern perspective, this corresponds to the stage when chronic nutritional deficits, gastrointestinal losses, and repeated minor illnesses culminate in overt anemia. Women in this age group are further affected by reproductive iron losses through multiple pregnancies and lactation.

A clear female predominance (approximately 72%) was observed, which aligns with classical Ayurvedic texts emphasizing women's higher susceptibility to Rakta Kshaya due to Raja pravritti (menstruation), Garbha dharana (pregnancy), Prasava (childbirth), and the post-partum phase (Sutika kala). Physiological blood loss, combined with inadequate dietary intake and social factors such as reduced food allocation and increased domestic workload, contributes to incomplete replenishment of Rakta dhatu. Modern studies corroborate this, noting regular menstrual iron loss, increased requirements during pregnancy, and exacerbation of deficits from short interpregnancy intervals or postpartum hemorrhage.

Reproductive factors, particularly marriage and childbearing, further elevate the risk of Rakta Kshaya. Deliveries and abortions produce acute depletion of Rakta dhatu, and insufficient post-partum or post-abortal care may initiate or exacerbate Pandu. Ayurveda emphasizes that neglecting Sutika paricharya leads to long-lasting Dhatu kshaya, while modern evidence confirms that each pregnancy requires an additional 500–800 mg of iron.

Occupational factors were also influential, with daily wage laborers comprising the largest group. Ayurveda identifies Ati Vyayama (excessive exertion) and Alpa Ahara as important Nidanas for Rakta Kshaya, as heavy physical work depletes bodily tissues and inadequate nutrition prevents replenishment. Modern interpretation highlights increased iron turnover, oxidative stress, and limited access to nutrient-rich foods among laborers .

Educational status further contributed to susceptibility, as illiteracy and primary-level education were prevalent. Ayurveda considers Avidya (lack of knowledge) a root cause of disease, leading to improper diet, irregular lifestyle, and neglect of seasonal regimens. Contemporary studies support this, showing that low education reduces health literacy, delays care-seeking, and limits awareness of iron-rich foods or supplementation, perpetuating anemia across generations.

A positive family history of anemia or Pandu was present in over half of the participants. Ayurveda's concept of Beeja dosha encompasses hereditary predisposition and constitutional traits that increase vulnerability to Rakta Kshaya, while modern medicine attributes familial clustering to shared environmental and dietary behaviors. Exclusion of hemoglobinopathies suggests that these patterns primarily reflect intergenerational nutritional practices and socio-economic conditions.

Dietary habits also played a significant role, with regular tea consumption being common. Ayurvedic texts describe substances with predominant Kashaya rasa and Ruksha guna as Rakta-upashoshaka, which impair Agni and hinder the transformation of Rasa to Rakta. Modern studies confirm that tannins in tea inhibit non-heme iron absorption, likely contributing to low hemoglobin levels despite adequate caloric intake . Constipation was prevalent, aligning with Mala sanga, which impairs digestive fire, increases Vata, and reduces Agnisakti, resulting in poor nutrient assimilation and progressive Rasa and Rakta dhatu depletion. Low fiber intake and poor dietary quality also contribute to constipation and nutritional anemia. Clinical examination revealed Shushka, Khara jivha, and Lipta coating, indicative of Agni dushti and Dhatu kshaya. Subjective features including Amla Ichha (craving for sour taste), Shira Saithilya (laxity / looseness of veins), and Rukshta (dryness of skin and mucosa) were prominent. Amla Ichha, observed in 69% of patients ($p < 0.001$), highlights the body's intrinsic compensatory response to Rakta Kshaya by stimulating Agni and supporting Rakta formation, corresponding to pica or altered taste perception in iron-deficiency anemia (NCBI, 2013). Śira Saithilya, observed in 80% of patients, represents the looseness and flaccidity of veins due to depletion of Rakta Dhātu. Clinically, this correlates with poor vascular filling, pallor, and reduced intravascular tone seen in anemia. Its high prevalence in the present study reinforces its diagnostic value as a cardinal lakṣaṇa of Pāṇḍu Roga.". Rukshta, seen in 78% of patients, reflects Vata-Pitta imbalance and dhatu depletion, aligning with dry skin, brittle nails, and mucosal dryness observed in anemia. These features exemplify karya–karana bhāva, where tissue depletion (karana) manifests as distinct clinical signs (karya).

Overall, the observed patterns illustrate a complex network of biological, social, and behavioral determinants culminating in Pandu. Chronic dietary inadequacy, excessive labor, impaired digestion, reproductive blood loss, low health awareness, and clinical features such as Amla Ichha, Shira Saithilya, and Rukshta act as karanas, resulting in the karya of anemia. The study underscores the integrated nature of Ayurveda's karya–karana bhāva and demonstrates the relevance of classical diagnostic markers in modern clinical practice.

Management requires an integrative approach. Ayurvedic measures include strengthening Agni, adopting Pathya ahara rich in Lauha and Rasayana dravyas, observing seasonal regimens, and providing Garbhini and Sutika paricharya. Modern strategies, including iron and folic acid supplementation, nutrition education, deworming, and public health programs, complement these measures, addressing both karana and karya for sustainable prevention and treatment.

Below is a representation of the grading and distribution of three key symptoms based on your assessment criteria.

Table 12: Amla Ichha (Craving for Sour Taste)

Amla Ichha (Craving for Sour Taste)	No. of Patients	Percentage (%)	χ^2 test
0 – Neither like nor dislike	62	31.0	
1 – Like extremely	48	24.0	
2 – Like moderately	50	25.0	
3 – Like slightly	40	20.0	
Total	200	100.0	$\chi^2 = 4.96$, p > 0.05

*Table 13: Shira Saithilya (*Laxity/looseness of veins)

Grade	No. of Patients	Percentage (%)
0 – No laxity	41	20.5
1 – Extreme laxity	26	13.0
2 – Moderate	68	34.0
3 – Slight	65	32.5
Total	200	100.0

Distribution of Shira Saithilya
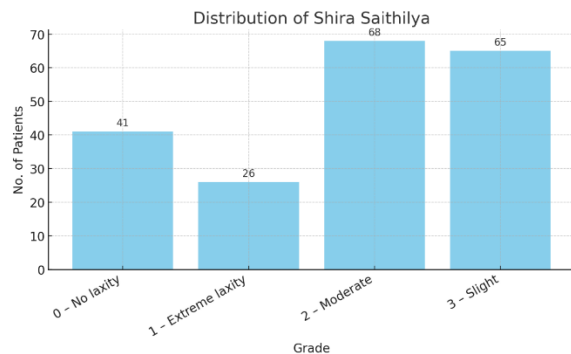
Table 14: Rukshta (Dryness)

Grade	No. of Patients	Percentage (%)
0 – Not seen	53	26.5
1 – Extreme	38	19.0
2 – Moderate	61	30.5
3 – Slight	48	24.0
Total	200	100.0

Distribution of Rukshta
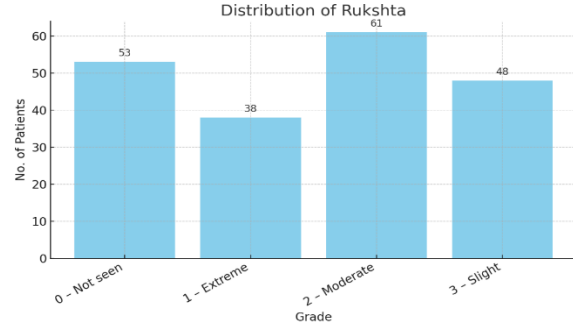
RESULT

Statistical Analysis of Data

The collected data were systematically coded and entered into a spreadsheet. Descriptive statistics, including percentage, mean, and standard deviation, were used to organize and summarize the findings.

For subjective clinical parameters, non-parametric tests were applied, with the level of statistical significance fixed at $p < 0.001$. In general, parametric tests are suitable when data are normally distributed and numerical in nature. However, when data do not follow normal distribution or are of ordinal type, non-parametric methods provide more valid results.

In the present observational study, the following statistical tools were utilized:

1. Kruskal–Wallis Test – This non-parametric test, considered the equivalent of ANOVA, was used to determine whether independent groups originated from the same distribution. Instead of analyzing raw values, data were converted into ranks, and the test was performed on these ranks to compare mean differences across groups.

2. Chi-square Test – This test was applied to examine differences between observed and expected frequencies in categorical data. It also helped assess associations between categorical variables in the study. By applying Chi-square, it was possible to determine whether the variation in clinical findings and demographic variables occurred by chance or represented a statistically significant relationship.

Chi-square Test Formula

$$\chi2 = \sum \frac{(O-E)^2}{E}$$

Where:

- O = Observed frequency (what you actually found in your study)
- E = Expected frequency (what would be expected if there were no difference/association)
- The summation (Σ) is taken over all categories.

Sample Size Formula

For prevalence studies, sample size is usually calculated using:

$$n = \frac{Z^2 \cdot p \cdot q}{d^2}$$

Where:

- n = required sample size
- Z = standard normal deviate (1.96 for 95% confidence)
- p = expected prevalence (in proportion, e.g., 0.30)
- q = 1−p
- d = allowable error (absolute precision, e.g., 0.05)

Table 1: Distribution of Patients According to Age (Years)

Age Group (Years)	No. of Patients	Percentage (%)	χ^2 test
< 20	20	10.0	
20–30	48	24.0	
31–40	42	21.0	
41–50	58	29.0	
> 50	32	16.0	
Total	200	100.0	χ^2 = xx.xx p < 0.001*

Interpretation: Age-wise distribution showed highest prevalence in the 41–50 year group. The majority of patients (29%) belonged to the age group of 41–50 years, followed by 24% in the 20–30 years group. This indicates that Pandu with Rakta Kshaya Lakshanas is more prevalent in the middle age group.

Table 2: Distribution of Patients According to Gender

Gender	No. of Patients	Percentage (%)	χ^2 test
Female	144	72.0	
Male	56	28.0	
Total	200	100.0	χ^2 = xx.xx p < 0.001*

Interpretation: The majority of patients were females (72%). Chi-square test showed a significant association between gender and anemia, indicating higher prevalence among females. The Chi-square test showed a significant association, suggesting higher predisposition of women to Rakta Kshaya Lakshanas. Globally, women are more prone to anemia due to menstrual blood loss, pregnancy, repeated childbirth, and poor nutrition. Ayurveda also recognizes that Raja Pravritti (menstruation) and Garbha Dharana (childbearing) naturally deplete Rakta Dhatu, making women more susceptible to Rakta Kshaya.

Table 3: Distribution According to Marital Status

Marital Status	No. of Patients	Percentage (%)	χ^2 test
Married	138	69.0	
Unmarried	62	31.0	
Total	200	100.0	χ^2 = xx.xx p = ns

Interpretation: Majority of cases were married. Chi-square test did not reveal a statistically significant difference with marital status.

Table 4: Distribution According to Occupation

Occupation	No. of Patients	Percentage (%)	χ^2 test
Laborer	131	65.5	
Student	39	19.5	
Service	16	8.0	
Homemaker	10	5.0	
Business	4	2.0	
Total	200	100.0	χ^2 = xx.xx p < 0.05*

Interpretation: Laborers formed the largest group (65.5%). Chi-square test showed significant association between occupation and Health surveys report higher anemia prevalence among daily wage workers due to low income, poor diet, and heavy physical activity. In Ayurveda, Ati Vyayama (over-exertion) and Alpa Ahara (inadequate food intake) are known Nidanas of Pandu.

CONCLUSION

The classical Signs and Symptoms of Pandu Roga—including Amla Ichha (craving for sour taste), Śira Saithilya (vein laxity), and Rukshta (dryness)—can be effectively used to clinically diagnose anemia and are statistically validated in this study.

Vataja Pandu can be correlated with mild microcytic hypochromic values, often. accompanied by slight Shira Saithilya and mild Rukshta.

Pittaja Pandu can be correlated with marked to severe microcytic hypochromic values, frequently presenting with pronounced Shira Saithilya, strong Amla Ichha, and severe Rukshta.

Kaphaja Pandu can be correlated with moderate microcytic hypochromic values, typically showing moderate Amla Ichha and Rukshta.

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