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A CRITICAL REVIEW ON ETIOPATHOGENESIS AND MANAGEMENT OF PANDU ROGA IN THE LIGHT OF IRON DEFICIENCY ANEMIA

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ABSTRACT

Background: *Pandu Roga* is described in classical Ayurveda as a disorder characterized predominantly by *Panduta* (pallor), *Daurbalya* (weakness), *Shrama* (fatigue), and *Hridspandana*. It is mainly considered a *Rasa–Rakta Dhatu Pradoshaja Vikara* with involvement of *Agnimandya* and vitiation of *Pitta Dosha*. In contemporary medicine, Iron Deficiency Anemia is the most prevalent nutritional deficiency disorder worldwide and presents with similar clinical manifestations such as pallor, fatigue, and reduced hemoglobin levels. The close resemblance between *Pandu Roga* and Iron Deficiency Anemia suggests a strong conceptual and clinical correlation. **Aim:** To critically analyze the etiopathogenesis and management of *Pandu Roga* in correlation with Iron Deficiency Anemia. **Objectives:** To review classical references regarding *Nidana*, *Samprapti*, and *Lakshana* of *Pandu Roga*. To understand the pathogenesis of Iron Deficiency Anemia in modern medicine. To establish

conceptual parallels between *Pandu Roga* and Iron Deficiency Anemia. To evaluate Ayurvedic principles of management including *Nidana Parivarjana*, *Shodhana*, and *Shamana Chikitsa*. **Materials and Methods:** This study is a critical narrative review based on classical Ayurvedic texts including *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*, along with contemporary medical literature related to Iron Deficiency Anemia. Relevant references were collected, analyzed, and interpreted to understand the etiopathogenesis and therapeutic principles from both perspectives. **Discussion:** According to Ayurveda, *Pandu Roga* originates primarily due to *Agnimandya*, leading to improper formation of *Rasa Dhatu*, which subsequently affects *Rakta Dhatu Poshana*. Vitiated *Pitta Dosha* along with impaired *Dhatu Agni* results in qualitative and quantitative deficiency of *Rakta*, manifesting as pallor and systemic weakness. In Iron Deficiency Anemia, inadequate dietary iron intake, poor absorption, chronic blood loss, or increased demand leads to reduced hemoglobin synthesis and impaired oxygen transport. The Ayurvedic approach emphasizes correction of *Agni*, purification through *Virechana* in suitable patients, and administration of *Rakta Vardhaka* and *Rasayana* drugs such as *Mandura Kalpa*, *Punarnava*, and *Draksha*. Dietary regulation and lifestyle modification play a central role in restoring tissue nourishment. **Conclusion:** *Pandu Roga* and Iron Deficiency Anemia share significant clinical and pathophysiological similarities. The Ayurvedic understanding of *Agnimandya*, *Rakta Kshaya*, and *Dhatu Poshana Nyaya* provides a comprehensive framework for understanding the disease process. Integrative management focusing on digestive correction, iron-rich diet, and classical formulations offers a holistic and sustainable therapeutic approach.

Keywords: *Pandu Roga*, Iron Deficiency Anemia, *Agnimandya*, *Rakta Dhatu*, *Rakta Kshaya*, *Mandura Kalpa*

INTRODUCTION

Pandu Roga[1] is a well-described clinical entity in Ayurveda, characterized mainly by *Panduta*[2] of skin, nails, eyes, and mucosa along with *Daurbalya*,[3] *Shrama*,[4] *Aruchi*,[5] and *Hridspandana*.[6] The term *Pandu* itself indicates pallor or yellowish-whitish discoloration of the body. Classical texts explain that this condition arises due to vitiation of *Pitta Dosha* along with impairment of *Rasa* and *Rakta Dhatu*. It is considered a *Rasa–Rakta Pradoshaja Vikara*,[7] where improper

tissue nourishment leads to systemic weakness and loss of vitality. Acharyas have emphasized that disturbed digestive fire or *Agnimandya*[8] plays a central role in its origin.

From a modern perspective, Iron Deficiency Anemia is one of the most common nutritional disorders worldwide. It occurs due to inadequate iron intake, poor absorption, chronic blood loss, or increased physiological demand. Reduced hemoglobin synthesis leads to decreased oxygen-carrying capacity of blood, resulting in fatigue, pallor, dizziness, and reduced work efficiency. Women of reproductive age, children, and pregnant females are particularly vulnerable. The high prevalence of Iron Deficiency Anemia remains a significant public health concern, especially in developing countries.

When we compare the classical description of *Pandu Roga* with the clinical presentation of Iron Deficiency Anemia, there is a strong similarity in signs and symptoms. The Ayurvedic concept of defective *Rakta Dhatu Poshana*[9] due to impaired *Agni* can be correlated with defective hemoglobin synthesis caused by iron deficiency. Just as modern science highlights nutritional deficiency and chronic blood loss, Ayurveda mentions *Aharaja Hetu*,[10] excessive *Raktasrava*, and *Pitta Prakopa*[11] as important causative factors. This conceptual overlap opens scope for deeper integrative understanding.

Therefore, a critical review of the etiopathogenesis and management of *Pandu Roga* in the light of Iron Deficiency Anemia becomes highly relevant. Understanding both perspectives helps in building a comprehensive approach that not only corrects hemoglobin levels but also improves digestive strength, tissue nourishment, and overall vitality. Such an integrative outlook can contribute to safer, sustainable, and holistic management strategies for patients suffering from anemia-like conditions.

AIM AND OBJECTIVES

Aim:

To critically analyze the etiopathogenesis and management of *Pandu Roga* in correlation with Iron Deficiency Anemia.

Objectives:

- To review classical references regarding *Nidana*, *Samprapti*, and *Lakshana* of *Pandu Roga*.

- To understand the pathogenesis of Iron Deficiency Anemia in modern medicine.
- To establish conceptual parallels between *Pandu Roga* and Iron Deficiency Anemia.
- To evaluate Ayurvedic principles of management including *Nidana Parivarjana*, *Shodhana*, and *Shamana Chikitsa*.

CONCEPTUAL STUDY

PANDU ROGA

The word *Pandu* is derived from the Sanskrit root "Pandi," which denotes pale, whitish, or yellowish discoloration. In Ayurveda, *Pandu* specifically refers to abnormal pallor of the skin and mucous membranes. This discoloration is not just cosmetic but reflects internal disturbance in *Rakta Dhatu* and systemic weakness. Thus, *Pandu Roga*[12] is primarily a disease where loss of normal complexion indicates deeper pathology related to tissue nourishment and vitality.

Historical and Classical Background

Pandu Roga has been elaborately described in classical texts like *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*.[13] Acharya Charaka classified it under major systemic disorders and described its *Nidana*, *Samprapti*, *Lakshana*, and *Chikitsa* in detail. Acharya Sushruta also explained its relation with vitiated *Pitta* and defective blood tissue. The consistent emphasis across texts shows that *Pandu* was considered a significant metabolic and hematological disorder even in ancient times.

Nidana (Etiological Factors)

The causative factors of *Pandu Roga* are mainly related to improper diet and lifestyle. Excessive intake of *Amla*,[14] *Lavana*, *Katu Rasa*, intake of incompatible food, excessive consumption of alcohol, and suppression of natural urges are important *Aharaja*[15] and *Viharaja Hetu*.[16] Repeated blood loss, worm infestation, and chronic illness are also mentioned. These factors aggravate *Pitta Dosha*[17] and weaken *Agni*,[18] leading to improper digestion and assimilation.

Psychological factors like excessive worry, fear, and stress are also described as contributing elements. Ayurveda clearly indicates that when both physical and mental factors disturb *Dosha* equilibrium, disease manifestation becomes more severe.

Samprapti (Etiopathogenesis)

The pathogenesis of *Pandu Roga* begins with *Agnimandya*.[19] Due to impaired digestive fire, proper formation of *Rasa Dhatu* does not occur. This defective *Rasa* fails to nourish subsequent *Dhatu*, especially *Rakta Dhatu*. Simultaneously, aggravated *Pitta Dosha* vitiates the blood tissue, leading to qualitative and quantitative depletion.

As *Rakta Dhatu* becomes deficient and impure, the natural complexion of the body fades, producing *Panduta*.[20] Since *Rakta* is responsible for life sustenance and oxygenation-like function, its depletion causes generalized weakness, fatigue, and reduced capacity for work. Thus, the root pathology lies in defective digestion and impaired tissue nourishment.

Nidana Sevana
(Improper diet, excessive *Amla–Lavana–Katu Rasa*, incompatible food, stress, blood loss)
⬇
Agni Dushti
⬇
Agnimandya (Impaired digestive fire)
⬇
Improper digestion and metabolism
⬇
Formation of *Ama* and defective *Rasa Dhatu*
⬇
Rasa Dhatu Kshaya / Dushti
⬇
Impaired *Dhatu Poshana Krama*
⬇
Defective nourishment of *Rakta Dhatu*
⬇
Simultaneous aggravation of *Pitta Dosha*
⬇
Pitta vitiates *Rakta Dhatu*
⬇
Rakta Kshaya + Rakta Dushti
(Qualitative and quantitative depletion)
⬇
Loss of normal complexion
⬇

Panduta (Pallor of skin, nails, eyes)
⬇
Reduced vitality and oxygenation-like function
⬇
Daurbalya – Shrama – Bhrama – Hridspandana
⬇
Generalized weakness and reduced work capacity

Pathology

Agnimandya → Defective *Rasa* Formation → Impaired *Rakta Dhatu Poshana* → Systemic Tissue Depletion

Dosha–Dushya Involvement

In *Pandu Roga*, *Pitta Dosha* plays the primary role, but *Vata* and *Kapha* may also be involved depending on chronicity and individual constitution. The main *Dushya* are *Rasa* and *Rakta Dhatu*. In advanced stages, involvement of *Mamsa*[21] and *Ojas*[22] may occur, leading to severe debility.

The disease is therefore considered a *Rasa–Rakta Pradoshaja Vikara*.[23] Disturbance in *Dhatu Agni* further worsens tissue depletion. When nourishment chain breaks at the level of *Rasa*, all subsequent tissues suffer indirectly.

Lakshana (Clinical Features)

The cardinal symptom of *Pandu Roga* is *Panduta* of skin, nails, eyes, and face. Other features include *Daurbalya*,[24] *Shrama*,[25] *Hridspandana*,[26] *Bhrama*,[27] *Aruchi*,[28] and *Gatra Shunyata*.[29] Some patients may experience breathlessness on exertion and intolerance to physical activity.

In severe stages, dryness of skin, swelling, and digestive complaints may appear. The symptom complex clearly indicates systemic tissue depletion and reduced vitality.

Bheda (Types of *Pandu Roga*)

Classical texts describe different types based on dominant *Dosha* such as *Vataja Pandu*, *Pittaja Pandu*, *Kaphaja Pandu*, *Tridoshaja Pandu*, and *Mridbhakshana Janya Pandu*.[30] Each type presents with specific features according to *Dosha* predominance.

For example, *Pittaja Pandu*[31] shows yellowish discoloration and burning sensation, while *Vataja Pandu* presents with dryness and pain. This classification helps in planning specific line of treatment.

Upadrava (Complications)

If untreated, *Pandu Roga* may progress to more serious conditions like *Kamala* and severe debility. Chronic depletion of *Rakta Dhatu*[32] may affect overall immunity and strength. Long-standing cases may show signs of exhaustion and reduced *Ojas*.

Prognosis (Sadhya–Asadhyata)

Prognosis depends on severity, duration, and *Dosha* involvement. Early-stage *Pandu* with mild symptoms and good digestive capacity is considered easily manageable. Chronic cases with severe depletion and associated complications require prolonged treatment and careful monitoring.

Conceptually, *Pandu Roga* represents a disorder of impaired digestion, faulty tissue metabolism, and defective blood formation. The central theme revolves around *Agnimandya* leading to improper *Rakta Dhatu Poshana*.[33] This holistic understanding highlights that treatment should not focus only on increasing blood quantity but also on correcting digestion, restoring metabolic balance, and improving tissue nourishment.

Management of *Pandu Roga*

Principle of Treatment (*Chikitsa Siddhanta*)

The management of *Pandu Roga* is primarily based on correction of *Agnimandya*, pacification of aggravated *Pitta Dosha*, and restoration of proper *Rakta Dhatu Poshana*.[34] Since defective digestion is the root cause, treatment begins with strengthening *Agni* and clearing metabolic toxins. Once the internal environment is corrected, therapies aimed at improving blood quality and quantity are administered. The overall goal is to restore complexion, strength, and vitality by addressing the disease from its root.

Nidana Parivarjana

Avoidance of causative factors forms the foundation of management. Improper dietary habits, excessive intake of sour and salty food, incompatible combinations, chronic stress, and blood loss must be corrected. By eliminating these etiological factors, further aggravation of *Pitta* and disturbance of *Rasa–Rakta Dhatu*[35] can be prevented. This step ensures that the treatment process becomes more effective and sustainable.

Deepana and Pachana

Since *Agnimandya* initiates the pathogenesis, improving digestive fire is essential. Mild *Deepana* and *Pachana* measures help remove accumulated *Ama*[36] and improve appetite and absorption. Once digestion becomes efficient, proper formation of *Rasa Dhatu* takes place, which in turn supports healthy development of *Rakta Dhatu*. This stage prepares the body for further therapeutic measures.

Shodhana Chikitsa

In suitable individuals, purification therapy is recommended to eliminate vitiated *Pitta Dosha*. *Virechana* is particularly beneficial as it cleanses the blood channels and corrects internal imbalance. By removing accumulated *Dosha*, it promotes better tissue metabolism and enhances the effectiveness of subsequent medications. This step is especially useful in patients with clear signs of *Pitta Prakopa*.[37]

Shamana Chikitsa

After purification or when *Shodhana* is not indicated, internal medicines are prescribed to pacify residual *Dosha* and improve blood formation. These formulations act as *Rakta Vardhaka* and *Balya*,[38] helping in qualitative and quantitative improvement of *Rakta Dhatu*. Gradually, pallor reduces, strength improves, and systemic symptoms diminish.

Rasayana Therapy

In chronic or recurrent cases, *Rasayana*[39] therapy is advised to strengthen depleted tissues and enhance overall immunity. It works at a deeper level by promoting sustained nourishment of *Dhatu* and improving vitality. This approach not only corrects deficiency but also prevents recurrence.

Pathya–Apathya

Diet and lifestyle regulation play a critical role in management. Easily digestible, nourishing, and iron-rich foods support recovery, while excessively sour, salty, spicy, and incompatible foods should be avoided. Adequate rest, mental calmness, and regular eating habits

contribute significantly to restoring normal complexion and energy levels. Proper adherence to dietary discipline ensures long-term success of therapy.

MODERN REVIEW

Iron Deficiency Anemia

Iron Deficiency Anemia[40] is the most common type of anemia worldwide. It occurs when the body does not have enough iron to produce adequate hemoglobin. Hemoglobin is the essential component of red blood cells responsible for carrying oxygen from the lungs to tissues. When iron levels fall, hemoglobin synthesis decreases, leading to reduced oxygen delivery and resulting in fatigue, weakness, and pallor.

Etiology

Iron Deficiency Anemia develops due to multiple causes. The most common reason is inadequate dietary intake of iron, especially in populations with poor nutritional habits. Chronic blood loss such as heavy menstrual bleeding, gastrointestinal bleeding, or parasitic infections is another major cause. Increased physiological demand during pregnancy, adolescence, and rapid growth periods can also deplete iron stores. Additionally, conditions that impair absorption, such as intestinal disorders, contribute to deficiency.

Pathogenesis

The condition progresses in stages. Initially, iron stores in the body become depleted. As deficiency continues, hemoglobin production declines, leading to microcytic and hypochromic red blood cells. Reduced hemoglobin concentration lowers the oxygen-carrying capacity of blood. This results in tissue hypoxia, which manifests clinically as fatigue, dizziness, breathlessness, and reduced work capacity.

Inadequate iron intake / Chronic blood loss / Increased demand / Poor absorption

⬇

Depletion of body iron stores (↓ Serum ferritin)

⬇

Reduced availability of iron for erythropoiesis

⬇

Decreased hemoglobin synthesis

⬇

Formation of microcytic, hypochromic red blood cells

⬇

Reduced hemoglobin concentration (↓ Hb level)

⬇

Decreased oxygen-carrying capacity of blood

⬇

Tissue hypoxia

⬇

Clinical manifestations

Fatigue – Weakness – Dizziness – Breathlessness – Reduced work capacity

Clinical Features

The most prominent symptom is pallor of the skin, nail beds, and conjunctiva. Patients commonly experience generalized weakness, easy fatigability, shortness of breath on exertion, and headache. In some cases, brittle nails, hair fall, glossitis, and angular stomatitis may appear. Severe deficiency may lead to tachycardia and decreased physical performance.[41]

Diagnosis

Diagnosis is confirmed through laboratory investigations. Hemoglobin levels are reduced, and peripheral smear typically shows microcytic hypochromic red blood cells. Serum ferritin levels are low, indicating depleted iron stores. Serum iron decreases, while total iron-binding capacity increases. These parameters help confirm iron deficiency[42] as the underlying cause of anemia.

Management

Management primarily focuses on correcting the underlying cause and replenishing iron stores. Oral iron supplementation is the standard treatment, usually given for several months to restore hemoglobin and replenish body reserves. In severe cases or when oral therapy is not tolerated, parenteral iron may be administered. Dietary modification[43] plays a crucial role, including consumption of iron-rich foods such as green leafy vegetables, legumes, jaggery, and animal sources where acceptable. Preventing chronic blood loss and improving nutritional awareness are essential for long-term control.

Prevention

Prevention[44] strategies include balanced diet, iron supplementation during pregnancy, deworming programs, and early detection through routine screening. Public health

interventions are especially important in high-risk groups like women of reproductive age and children. Early management prevents complications and improves overall productivity and quality of life.

Treatment and Management

Correction of Underlying Cause

The first step in management is identifying and correcting the root cause of iron deficiency. If the anemia is due to chronic blood loss, the source must be treated, such as managing heavy menstrual bleeding or gastrointestinal bleeding. In cases of parasitic infestation, deworming is necessary. Addressing malabsorption disorders is also important to ensure proper nutrient uptake.

Iron Supplementation

Iron replacement therapy is the mainstay of treatment. Oral iron preparations are commonly prescribed and are usually continued for several months to restore hemoglobin levels and replenish iron stores. Treatment is generally maintained even after hemoglobin becomes normal to rebuild body reserves. In cases where oral iron is not tolerated or absorption is poor, parenteral iron therapy may be administered under medical supervision.

Dietary Management

Dietary improvement plays a crucial role in long-term management. Patients are advised to consume iron-rich foods such as green leafy vegetables, legumes, whole grains, jaggery, dates, nuts, and, where acceptable, animal sources like meat and liver. Vitamin C–rich foods such as citrus fruits enhance iron absorption and should be included. Tea and coffee should be avoided immediately after meals, as they reduce iron absorption.

Management in Special Groups

Pregnant women, adolescents, and young children require special attention due to increased physiological demand. Routine iron and folic acid supplementation is often recommended in these groups as part of preventive healthcare programs. Regular screening helps in early detection and timely management.

Monitoring and Follow-Up

Regular monitoring of hemoglobin and iron parameters is essential to assess response to treatment. Clinical improvement, such as reduction in fatigue and pallor, is usually observed within a few weeks. Continued follow-up ensures complete recovery and prevents recurrence.

Prevention Strategies

Preventive measures include maintaining a balanced diet, public health awareness about nutritional anemia, periodic deworming in endemic areas, and routine supplementation in high-risk populations. Early intervention significantly reduces complications and improves overall quality of life.

RESULTS AND FINDINGS

- The clinical features of *Pandu Roga* such as *Panduta*, *Daurbalya*, *Shrama*, and *Hridspandana* closely resemble the signs and symptoms of Iron Deficiency Anemia.
- Both conditions show a common presentation of pallor, fatigue, reduced work capacity, and generalized weakness.
- The etiological factors described under *Aharaja Hetu* and chronic *Raktasrava* in *Pandu Roga* correlate with poor dietary iron intake and chronic blood loss in Iron Deficiency Anemia.
- The central role of *Agnimandya* in *Pandu Roga* conceptually parallels impaired iron absorption and defective hemoglobin synthesis in Iron Deficiency Anemia.
- The involvement of *Rasa* and *Rakta Dhatu Kshaya* corresponds to reduced hemoglobin concentration and depleted iron stores observed in laboratory investigations.
- *Pitta Dushti* affecting *Rakta Dhatu* in Ayurveda can be correlated with qualitative changes in red blood cells such as microcytosis and hypochromia.
- Classical Ayurvedic management focusing on *Deepana*, *Pachana*, and *Rakta Vardhana* supports improvement in digestion, absorption, and blood formation.

- Use of *Mandura Kalpa* and other *Rakta Vardhaka* formulations demonstrates therapeutic potential in improving hemoglobin levels.
- Integrative management combining dietary correction, digestive enhancement, and iron supplementation provides better symptomatic relief and sustained recovery.
- Overall findings suggest strong conceptual and clinical similarity between *Pandu Roga* and Iron Deficiency Anemia, supporting the relevance of Ayurvedic principles in its management.

DISCUSSION

Pandu Roga described in Ayurveda shows strong clinical similarity with Iron Deficiency Anemia. The classical features like *Panduta*, *Daurbalya*, *Shrama*, and reduced physical capacity closely match the modern presentation of pallor, fatigue, and breathlessness. Ayurveda explains the disease beginning with *Agnimandya*, leading to improper formation of *Rasa Dhatu* and subsequent defective *Rakta Dhatu Poshana*. In modern terms, this can be understood as impaired nutrient absorption and defective hemoglobin synthesis. Thus, both systems recognize that disturbance at the level of nourishment ultimately results in blood deficiency and systemic weakness.[45]

The etiological factors also show conceptual overlap. Ayurveda mentions excessive intake of improper diet, chronic blood loss, and tissue depletion as causes of *Pandu Roga*. Similarly, Iron Deficiency Anemia develops due to inadequate iron intake, poor absorption, chronic bleeding, or increased demand. The concept of *Pitta Dushti* affecting *Rakta Dhatu* can be correlated with qualitative changes in red blood cells such as microcytosis and hypochromia. While modern science focuses on biochemical deficiency, Ayurveda provides a broader metabolic perspective by emphasizing digestive strength and tissue transformation.[46]

In terms of management, Ayurveda offers a comprehensive approach by correcting *Agni*, eliminating vitiated *Dosha*, and promoting *Rakta Vardhana*. Modern treatment mainly relies on iron supplementation and dietary correction. An integrative approach combining digestive improvement, proper nutrition, and iron therapy may provide better and sustained outcomes. Therefore, understanding *Pandu Roga* in the light of Iron Deficiency Anemia helps

bridge classical concepts with contemporary knowledge, creating a more holistic and practical management strategy.[47]

CONCLUSION

Pandu Roga and Iron Deficiency Anemia share significant clinical and conceptual similarity, particularly in relation to pallor, weakness, and reduced vitality. Ayurveda explains the condition through the mechanism of *Agnimandya*, defective *Rasa* formation, and impaired *Rakta Dhatu Poshana*, while modern medicine attributes it to inadequate iron availability and reduced hemoglobin synthesis. Both perspectives highlight the importance of proper nutrition and correction of underlying causes. A comprehensive approach that combines digestive correction, dietary regulation, and appropriate supplementation can ensure effective recovery and long-term prevention, making the integrative understanding of *Pandu Roga* highly relevant in present clinical practice.

CONFLICT OF INTEREST -NIL

SOURCE OF SUPPORT -NONE

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