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REVIEW ARTICLE

Systematic Review of *Ayurvedic* Treatments for Iron Deficiency Anaemia: Evidence and Insights

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Abstract

Introduction: Iron Deficiency Anaemia (IDA), referred to as *Pandu Roga* in *Ayurveda*, is a prevalent global health issue characterized by pallor and systemic symptoms associated with disruption in the *Rasa* and *Rakta dhatus*. *Ayurvedic* texts classify *Pandu Roga* into various types based on *doshic* involvement, emphasizing its multifaceted pathogenesis. **Methods:** This systematic review evaluates *Ayurvedic* interventions for IDA through 11 randomized controlled trials conducted from 2015 to 2024. Studies included *Shamana Chikitsa* approaches targeting symptomatic relief and haematological restoration using formulations like *Punarnava Mandura*, *Dhatri Lauha*, and *Vajravatak Mandura*. Trials employed diverse designs, including open-label, single-blind, and double-blind methodologies, with randomization methods such as Simple Random Sampling. **Results:** Significant improvements were observed in subjective symptoms (pallor, weakness) and objective haematological parameters (haemoglobin levels, red blood cell counts, serum iron) across the reviewed studies. Combinations like *Darvyadi Lauha* and *Vasadi Kashaya* demonstrated superior efficacy compared to individual treatments, highlighting their potential in managing IDA. **Discussion:** The findings underscore the potential of *Ayurvedic* interventions in addressing IDA, especially in populations preferring traditional medicine or facing accessibility challenges. Methodological diversity enhances the robustness of findings while advocating for standardized protocols and larger-scale studies to validate efficacy and safety. Integrating *Ayurvedic* insights into mainstream healthcare frameworks could enhance holistic approaches to global health challenges.

Major Findings: The included 11 RCTs demonstrated that *Ayurvedic Shamana Chikitsa* significantly improved hemoglobin levels and associated symptoms of Iron Deficiency Anaemia across all age groups. Punarnava Mandura and Navayasa Lauha showed consistent efficacy, with better tolerability compared to conventional iron therapy. Age-specific responses indicated favorable outcomes in children, adults, and the elderly.

Keywords: Anaemia, *Ayurveda*, *Shamana Chikitsa,* Systematic Review

1. Introduction

Anaemia, referred to as *Pandu Roga*[1], has been well-documented since the Vedic period. According to Acharya Charak, anaemia is a condition caused by the disruption of the primary nutrient fluid derived from digested food (*Rasa*), and it predominantly involves the *Pitta dosha* while also being influenced by all three *doshas*[2]. According to Acharya Sushrut, *Pandu* is a disease resulting from the vitiation of the blood tissue (*Rakta*)[3]. It is referenced in both the major *Ayurvedic* texts (*Bruhattrayi*) and the minor *Ayurvedic* texts (*Laghutrayi*)[4].

Anaemia, or *Pandu roga*, is characterized by a loss of the body's natural lustre and a pale skin tone. Ancient texts describe this discolouration as similar to the dust of the *Ketki* flower (*Pandanus odoratissimus*). The primary diagnostic indicator of anaemia, or *Pandu roga*, is pallor (*Pandura varna*)[5], which manifests as a noticeable change in the body's colour. Skin pallor (*Panduta*) is caused by the vitiation of the *Rakta dhatu* (blood tissue) in the body[6]. It leads

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to symptoms such as blood depletion, fatigue, body aches, palpitations, periorbital edema, loss of appetite, shortness of breath, and fainting. According to *Acharya Charak*, anaemia (*Pandu roga*) can be classified into five types: *Vataja, Pittaja, Kaphaja, Sannipataja*, and *Mrudabhakshanjanya*[7].

While directly correlating an *Ayurvedic* disease with a specific modern medical condition can be challenging, the term *Pandu* has been equated with anaemia by comparing the symptoms described in *Pandu roga* texts with those associated with anaemia in modern literature. Anaemia is characterized by a decrease in the number of red blood cells (RBCs) per cubic millimetre of blood and a lower concentration of haemoglobin (Hb%) within those RBCs. This reduction in haemoglobin levels diminishes the blood's ability to carry oxygen to all tissues, leading to symptoms such as paleness and other associated manifestations[8]. Anaemia leads to a weakened immune system, reduced work capacity, impaired cognitive function, and diminished overall quality of life[9].

Anaemia is a significant global public health issue that impacts human health, as well as social and economic development. Anaemia can result from a variety of factors, with nutritional deficiency being a major cause. IDA is the most prevalent form of anaemia, leading to IDA and anaemia often being used interchangeably. Approximately 30-52% of the population in non-industrialized regions suffers from anaemia, with iron deficiency being particularly common[10]. Iron deficiency and IDA are recognized as one of the top 10 global and regional health risks[11], ranking as the 14th leading cause of disease burden worldwide according to the global burden of diseases[12].

In India, surveys have indicated a high prevalence of anaemia[13]. The prevalence of anaemia in India is notable, with 56.2% of women aged 15-49, 79.2% of children aged 6-35 months, 57.9% of pregnant women, and 24.3% of men aged 15-49 being affected. Overall, 55% of women and 25% of men suffer from anaemia[14]. Iron deficiency is estimated to cost India around 5% of its annual Gross National Product (GNP) due to the loss of lives, resources, and productivity[13].

IDA is a considerable public health problem, impacting millions, mainly women and children. Conventional iron supplementation is commonly associated with gastrointestinal side effects and poor patient adherence. Ayurveda, using a holistic approach may present potential alternatives that can enhance iron absorption with minimal side effects. This study is essential to evaluate the efficacy of Ayurvedic interventions for IDA, providing evidence-based insights that can contribute to safer and more effective treatment options.

This systematic review aims to examine past clinical research on various interventions used for managing *Pandu roga* (Iron Deficiency Anaemia) and to develop a specific treatment protocol based on the findings. The objective of this article is to assess the efficacy of *Ayurvedic* medicine for the management of *Pandu roga*.

2. Materials and Methods

All relevant information is gathered from past research studies, specifically randomized clinical trials involving *Shamana Chikitsa* for the management of anaemia. These studies have been published in various peer-reviewed journals and are accessible through multiple databases such as PubMed, Researchgate, Google Scholar, *Shodhganga*, and the Cochrane Library. The time frame for the collected studies spans from 2015 to May 2024, regardless of their study centre. Key article references were manually searched using keywords like *Shamana Chikitsa*, *Pandu roga*, anaemia, *Punarnava andura*, pallor, herbal drugs, and herbal-mineral combination. Additionally, experts in the field were consulted for further studies. Only publications in English were considered for inclusion. Two reviewers independently screened both the titles and abstracts, as well as the full texts, of the retrieved articles. A narrative synthesis detailing the characteristics of study participants, types of interventions, and specific outcomes is provided.

2.1 Study Selection

- Inclusion Criteria: The meta-analysis focused exclusively on *Ayurvedic* controlled clinical trials, specifically randomized controlled trials conducted on patients with anaemia from 2015 to May 2024.
- Exclusion Criteria: *Ayurvedic* review articles on anaemia (IDA), *Ayurvedic* non-randomized clinical trials, *Ayurvedic* clinical studies on anaemia complications, anaemia other than iron deficiency anaemia, related animal studies, case studies or case

series, and modern studies were excluded from the research.

- Assessment Parameters: These studies were evaluated according to the inclusion and exclusion criteria, the methodology employed, the assessment parameters, the type of intervention (*Shamana Chikitsa*), and the reported outcome measures.

3. Observations

After conducting a comprehensive search using selected databases including PubMed, Google Scholar, Scopus, Web of Science, and *Shodhaganga*, a total of 247 articles were retrieved. Following an extensive review of the literature from the aforementioned sources, 39 duplicate articles were removed. Of the remaining 208 items, 54 articles were excluded after title and abstract screening as they were not relevant to the study's aim and objectives. Out of the 154 full-text articles identified, 143 were excluded because they were not related to the methodology. The 143 articles were excluded for the following reasons: 79 were literature reviews, 16 were case reports, 07 were observational studies, 23 were Non RCT and the remaining 18 did not meet the methodology, inclusion, and exclusion criteria.

A systematic review was conducted by critically analysing 11 interventional studies (RCT) to evaluate the necessity and role of *Shamana Chikitsa*. Among these 11 RCTs, there were observed that total 601 anaemic patients

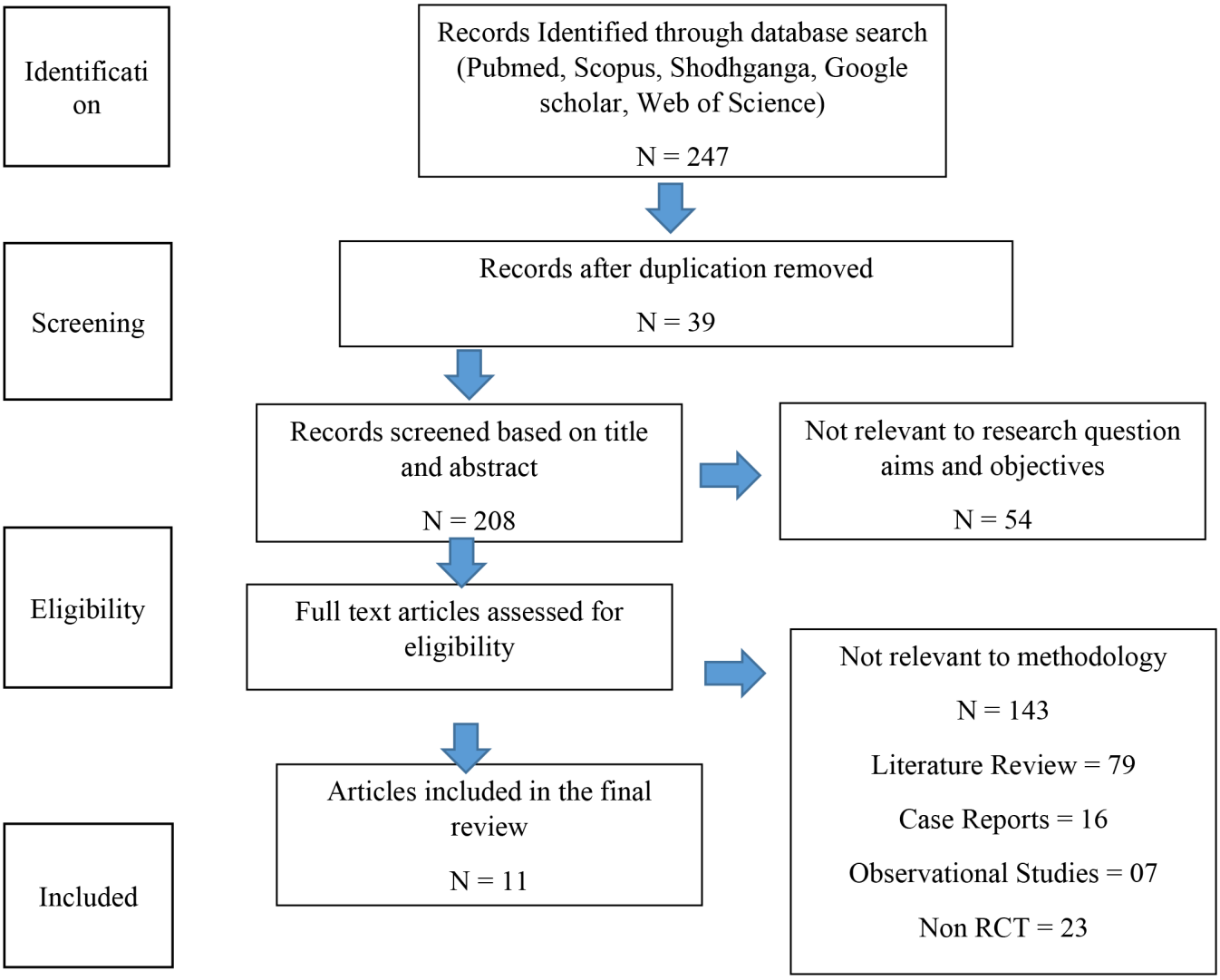


Figure 1. Prisma flow diagram.

underwent for *Ayurvedic* interventions. These studies were conducted at various research centres across India. The detailed selection process of the included articles is illustrated using a PRISMA flow diagram.

The specifics of the randomised clinical studies conducted on anaemic patients are mentioned in Table 1.

The key attributes of the included studies are summarized as follows:

Table 1. Showing details of RCTs

Sr. No.	Title	Medicine with dose	Conclusion
1	Clinical evaluation of *Dravyadi lauha* and *Vasadi kashaya* in the management of *Pandu roga* w.s.r. to Iron Deficiency Anaemia[15].	Group A- *Darvyadi lauha* 250mg BD with lukewarm water. Group B- *Vasadi Kashaya* 40ml Bd with lukewarm water. Group C- *Darvyadi lauha* and *Vasadi Kashaya*.	Group C, with combined administration of *Darvyadi Lauha* and *Vasadi Kashaya*, showed the highest improvement at 45.97%, outperforming Group A (30.61%) and Group B (32.20%). This combination effectively enhanced general well-being and significantly improved clinical and hematological parameters in patients with *Pandu Roga*.
2	The functional utility of *Srotomoola chikitsa* in purview of *Pandu roga* - a clinical study[16].	Group A- *Vrikshamala churna* 05gm BD with water. Group B- *Shadushna churna* 03gm BD with water. Group C- *Phaltrikadi Ghan Vati* 500mg BD with water.	The study demonstrated that targeting *srotomoola*, the functional roots of *srotasa*, significantly improved treatment outcomes for *dhatu pradoshaja vikara*. Combining *srotomoola chikitsa* with *vyadhi pratyanika chikitsa* yielded superior clinical and statistical results, highlighting its effectiveness in *Ayurvedic* treatment.
3	Clinical efficacy of *Punarnava Mandura* and *Dhatri Lauha* in the management of *Garbhini Pandu* (anemia in pregnancy)[17].	Group A-*Punarnava Mandura* 500mg TID with buttermilk. Group B- *Dhatri lauha* 500mg TID with lukewarm water.	*Punarnava Mandura* demonstrated superior efficacy in treating *Garbhini Pandu* compared to *Dhatri Lauha*, especially at increased doses, effectively breaking the disease pathogenesis. Both drugs were safe and effective, but *Punarnava Mandura* provided better overall results.
4	Effect of *Ayurveda* Medications (*Kasīsa Bhasma* and *Dhātrī Avaleha*) on Iron Deficiency Anaemia: A Randomized Controlled Study[18].	Group D- *Dhatri Avaleha* 10gm BD with water. Group K- Cap. *Kaseesa bhasma* 125mg TID with water.	This study demonstrates that *Kasīsa bhasma* significantly improves primary and some secondary outcomes in managing Iron Deficiency Anemia (IDA), while *Dhātrī avaleha* also shows substantial benefits during intervention and sustainability periods. Both treatments, particularly *Kasīsa bhasma*, provide effective, safe, and economical alternatives.
5	Study to Evaluate efficacy of *Vajravatak mandura* in Iron Deficiency Anaemia in Adolescent Girls - A Randomized Controlled Trial[19].	Group A- *Vajravatak mandura* 250mg BD with buttermilk. Group B- 100mg elemental iron and 500mcg folic acid with water.	The trial drug *Vajravatakmaṇḍura* proved as effective as IFA tablets in managing nutritional anaemia in adolescent girls, showing significant improvements in most parameters without adverse effects. *Vajravatakmaṇḍura* is thus a safe and palatable alternative for treating iron deficiency anaemia in this population.
6	A comparative clinical study to evaluate the efficacy of *Darvyadi lehya* and *Drakshadi lehua* in *Pandu roga* W.S.R. to IDA[20].	Group A- *Drakshadi lehya* 10gm BD with lukewarm water. Group B- *Darvyadi lehya* 10gm BD with lukewarm water.	The clinical trial found that both *Darvyadi* and *Drakshadi lehya* treatments produced highly significant improvements in subjective parameters and most objective criteria for *Pandu Roga*. However, no significant difference was observed between the two treatments, indicating both are equally effective.
7	A comparative clinical study to evaluate efficacy of *Dhatri Lauha Vati* and *Darvyadi Lauha Vati* in *Pandu Roga* W.S.R. Iron Deficiency Anaemia[21].	Group A- *Dhatri loha vati* 250mg BD with water. Group B- *Darvyadi loha vati* 250mg BD with water.	The study concludes that *Darvyadi Lauha Vati* is more effective than *Dhatri Lauha Vati* in treating *Pandu Roga*, particularly in reducing symptoms and increasing hemoglobin levels without adverse effects. The findings highlight the prevalence of this condition among females and lower to middle-class populations due to various physiological and lifestyle factors.

Table 1. Continued...

Sr. No.	Title	Medicine with dose	Conclusion
8	Comparative Study of *Sammoha Loha*, *Navayas Loha* and *Mustadi Churna* in the *Pandu Vyadhi* W.S.R. Anaemia[22].	Group A- *Sammoha loha* 250mg BD with honey. Group B- *Mustadi churna* 250mg BD with honey. Group C- *Navayas loha* 250mg BD with honey.	The therapies for *Pandu Roga* (anaemia) in Groups A, B, and C demonstrated highly significant improvements in key symptoms like *Panduta*, *Agnimandya*, Aruchi, and *Akshikuta Shotha*. Group A showed the most significant increase in haemoglobin levels (P<0.001), followed by Group B (P<0.001), and Group C (P 0.006). All groups showed highly significant results in alleviating other symptoms and improving haematological parameters, confirming the efficacy of the treatments.
9	A Comparative Study of *Bibhitakadi Vatak* and *Dhatri Lauha* in the Management of *Pandu Roga* W.S.R. to Iron Deficiency Anaemia in Children[23].	Group A- *Bibhitakadi Vatak* Syrup 1ml/kg/day. Group B- *Dhatri lauha* Syrup 1ml/kg/day.	Both *Dhatri Lauha* Syrup and *Bibhitakadi Vatak* Syrup showed extremely significant results in treating *Pandu Roga* in children. However, *Dhatri Lauha* in Group A demonstrated consistently better percentage improvements in most subjective and objective parameters, making it the more effective treatment. Both drugs are safe and effective for managing *Pandu Roga*.
10	A comparative study of *Navayasa churna* and *Nisha lauha* in the management of *Pandu* W.S.R. to Iron Deficiency Anaemia (IDA)[24].	Group A- *Navayasa churna* 500mg BD with *Ghrita*. Group B- *Nisha lauha* 250mg BD with *Ghrita*.	Group A (*Navayasa Churna*) provided better results in all signs and symptoms, including Hb, serum iron, serum ferritin, and TIBC, with significant improvement in RBC. Group B (*Nisha Lauha*) also showed notable improvements in serum iron, serum ferritin, and TIBC. No side effects were observed. Therefore, *Navayasa Churna* is the superior treatment choice for *Pandu Roga*.
11	A clinical study of some Indigenous *Ayurvedic* drugs on *Pandu roga* w.s.r to Iron Deficiency Anaemia[24,25].	Group A- *Shigrupatra churna* 05gm BD with Shunthi Siddha Jala. Group B- *Pancharasayana yoga* 05gm TID with milk.	Both Group A and Group B showed highly significant improvements in Hb% with 21.4% and 21.77% increases respectively (t value 8.12, p < .0001 for Group A; t value 7.83, p < .0001 for Group B). Analytical reports confirmed iron content in both drugs (2.525% in *Shigru Patra Churna* and 1.92% in *Panchrasayana Yoga*), supporting their role in enhancing haemoglobin levels.

3.1 Type of Randomization and Methodology

The number of trials using various methodologies, such as double-blind and single-blind, are listed in Table 2. Some trials utilised randomization methods like lottery or coin methods, while others employed Simple Random sampling for randomization. All trials are single-centre studies. The sample sizes varied depending on the study design used.

3.2 Inclusion and Exclusion Criteria

All the participants recruited in the studies were aged between 01 and 70 years, regardless of gender. The studies predominantly focused on participants aged between 20 and 60 years. Anaemic patients younger than 1 year and older than 70 years were excluded from these 11 studies.

3.3 Assessment Criteria

Across these 11 clinical trials, a total of 18 different symptoms of Anaemia, such as *Panduta* (pallor), *Daurbalya* (weakness), *Aruchi* (anorexia), *Bhrama* (giddiness), *Shwasa* (dyspnoea), *Hridaspandana* (palpitation), *Pindikodwestana*(pain in calf muscles), *Shrama*(fatigue),*Akshikutashotha*(periorbitalswelling), *Rukshata* (dryness), *Nindra Adhikya* (excessive sleep), *Angasadan* (bodyache), *Krodh* (anger), *Agnimandya* (indigestion), *Asahishnuta* (intolerance), *Karnakshveda* (tinnitus), *Gaurav* (heaviness in body), were assessed as subjective variables. Along with these subjective

Table 2. Distribution of trials across different methodologies varies

Sr. No.	Type of Methodology	Number of Studies
Study depends upon type of Blind		
1	Open Study	07
2	Single Blind	03
3	Double Blind	01
Study depends upon Randomisation		
1	Lottery Method	01
2	Coin Method	01
3	Simple Random Sampling	08
4	No Randomisation	01

Table 3. Showing trials with type of assessment parameters

Sr. No.	Assessment Parameters	Number of Studies
1	Studies conducted with only symptoms of Anaemia	-
2	Studies conducted with only objective criteria	01
3	Studies with combination of both	10

parameters, objective parameters like haemoglobin, Total Leukocyte count (TLC), Differential Leukocyte Count (DLC), ESR, PCV, MCV, MCH, MCHC and serum iron were also assessed. The number of trials evaluated with different variables, including those with only objective variables and those with a combination of both subjective and objective variables, is provided in Table 3. No single trial was conducted that focused exclusively on symptoms of anaemia.

3.4 Type of Intervention

All the clinical studies chosen for this systematic review concentrate exclusively on *Shamana* interventions. Clinical studies focusing on specific *Shamana* interventions were further categorized based on the type of treatment used: herbal drugs, mineral drugs, a combination of herbo-mineral drugs, or lifestyle modifications. These classifications are detailed in Table 4.

4. Results

The treatment protocol for *Pandu Roga* based on clinical evidence from various studies founded as mentioned in Table 1.

Table 4. Showing trials with specific type of *Shamana Chikitsa*

Sr. No.	*Shamana Chikitsa*	Number of Studies
1	Only herbal drugs	03
2	Only mineral drugs	00
3	Combination of both	08

For general adult patients, a combination of *Darvyadi Lauha* 250 mg BD with lukewarm water) and *Vasadi Kashaya* (40 ml BD with lukewarm water) has shown the highest efficacy, with a 45.97% improvement in symptoms and hematological parameters. *Navayasa Churna* (500 mg BD with *Ghrita*) has demonstrated superior results in increasing hemoglobin, serum iron, and ferritin levels. Additionally, *Dhatri Lauha Vati* (250 mg BD with water) is effective but slightly less potent than *Darvyadi Lauha*.

In pregnant women (*Garbhini Pandu*), *Punarnava Mandura* (500 mg TID with buttermilk) has proven to be the most effective in managing anemia and breaking disease pathogenesis, while *Dhatri Lauha* (500 mg TID with lukewarm water) is a safe and effective alternative but with slightly lower potency.

For adolescents, *Vajravatak Mandura* (250 mg BD with buttermilk) serves as a safe and effective alternative to Iron-Folic Acid (IFA) tablets, without adverse effects.

In children, *Dhatri Lauha* Syrup (1 ml/kg/day) has demonstrated superior results in improving subjective and objective parameters compared to *Bibhitakadi Vatak* Syrup (1 ml/kg/day), which is effective but slightly less potent.

5. Discussion

Anaemia, known as *Pandu Roga* in *Ayurveda*, has been recognized since ancient times and continues to be a significant health concern globally[26]. This systematic review aimed to evaluate the efficacy of *Ayurvedic* interventions, specifically *Shamana Chikitsa*, for managing IDA, correlating traditional *Ayurvedic* principles with modern clinical outcomes.

5.1 Traditional *Ayurvedic* Perspective

According to *Ayurvedic* texts attributed to *Acharya Charak* and *Acharya Sushrut*, *Pandu Roga* is understood as a condition primarily affecting the *Rasa* and *Rakta dhatus* (nutrient fluid and blood tissue). It is classified into various

types based on *doshic* involvement and pathogenesis, such as *Vataja*, *Pittaja*, *Kaphaja*, *Sannipataja*, and *Mrudabhakshanjanya*. The primary symptom, pallor (*Pandura varna*), is indicative of underlying *Rakta dhatu* vitiation, leading to a range of clinical manifestations including fatigue, palpitations, and loss of appetite[27].

5.2 *Ayurvedic* Interventions Evaluated

The systematic review included 11 randomized controlled trials (RCTs) conducted between 2015 and 2024, focusing on *Ayurvedic* treatments for anaemia. These trials predominantly employed *Shamana Chikitsa*, targeting symptomatic relief and restoration of hematological parameters. Various *Ayurvedic* formulations were studied, such as *Punarnava Mandura*, *Dhatri Lauha*, *Darvyadi Lauha*, and *Vajravatak Mandura*, among others. The treatments were administered in different forms, including tablets, syrups, and powders, often combined with dietary recommendations.

5.3 Clinical Findings and Efficacy

Across the studies reviewed, significant improvements were observed in subjective symptoms like pallor, weakness, and fatigue, as well as objective parameters including haemoglobin levels, red blood cell counts, and serum iron levels.

Studies have demonstrated that *Ayurvedic* formulations like *Darvyadi Lauha, Vasadi Kashaya*, and *Punarnava Mandura* significantly improve not only clinical symptoms but also key laboratory parameters such as hemoglobin levels, serum iron, serum ferritin, and TIBC.

5.4 Methodological Considerations

The included RCTs utilized various methodologies, including open-label, single-blind, and double-blind designs, with randomization methods like Simple Random Sampling. This diversity in study design enhances the robustness of findings and ensures rigorous evaluation of *Ayurvedic* interventions. Assessment criteria encompassed both subjective symptoms and objective haematological parameters, providing comprehensive insights into treatment outcomes.

5.5 Implications for Practice and Future Research

The findings underscore the potential of *Ayurvedic* interventions in managing Iron Deficiency Anaemia, particularly in populations where traditional medicine is culturally preferred or where conventional treatments may not be accessible or suitable. However, the review also highlights the need for standardized protocols, larger sample sizes, and longer-term follow-up studies to further validate efficacy and safety profiles. Integrating *Ayurvedic* insights with modern research methodologies can facilitate evidence-based practice and contribute to holistic healthcare approaches.

6. Conclusion

In conclusion, this systematic review supports the efficacy of *Ayurvedic Shamana Chikitsa* in managing iron deficiency anaemia based on current clinical evidence. The findings advocate for continued research and integration of *Ayurvedic* principles into mainstream healthcare frameworks to address global health challenges effectively.

This study provides a foundation for further exploration and application of *Ayurvedic* treatments in managing anaemia, emphasizing their role in improving quality of life and health outcomes across diverse populations.

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8. Author Contribution

Dr. Varun Gupta conceptualized and designed the study, curated data and prepared the original data. Dr. Dnyanesh Joshi discussed methodology. Dr. Bhushan Mhaiskar and Dr. Maltee Patel provided valuable inputs towards designing the manuscript and analysing data. All authors read and approved the final version of the manuscript.

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