

Efficacy of Cephalic Douche and Drumstick Leaves Juice on Iron Deficiency Anemia Among Adult Females: A Randomised Controlled Trial

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ABSTRACT

Background & Objectives: Iron Deficiency Anemia (IDA) is the most prevalent nutritional deficiency worldwide, particularly among women of reproductive age. Conventional iron supplementation is effective yet often limited by poor compliance and side effects. Naturopathic interventions such as Cephalic Douche and Moringa oleifera (drumstick) leaves juice may offer low-cost, accessible alternatives. This study aimed to evaluate their efficacy on hemoglobin, serum ferritin, fatigue and quality of life in adult females with IDA.

Methods: A randomized controlled trial was conducted among 70 female participants (18–24 years) with hemoglobin < 10 g/dL. Participants were allocated by lottery into two groups: study (n = 35) and control (n = 35). The study group received 100 ml fresh Moringa oleifera leaf juice daily for 21 days and Cephalic Douche (38 °C, 3–5 minutes, 5 days/week for 15 days). Controls received no intervention. Primary outcomes included hemoglobin and serum ferritin; secondary outcomes included fatigue (FAS) and WHOQOL-BREF scores. Data were analyzed using SPSS v27 with $p < 0.05$ as significant.

Results: Significant increases were observed in hemoglobin and serum ferritin levels and a reduction in fatigue scores in the study group compared to controls ($p < 0.001$). The intervention was well tolerated with no adverse effect.

Conclusion: Combined Moringa oleifera leaf juice and Cephalic Douche proved effective in improving hematological and symptomatic parameters among young women with IDA. This integrative, low-cost approach could be adapted in community settings to complement existing anemia-control programs.

Keywords: Iron Deficiency Anemia, Cephalic Douche, Moringa Oleifera, Drumstick Leaves Juice, Naturopathy, Randomized Controlled Trial.

INTRODUCTION

Iron Deficiency Anemia (IDA) is the most widespread nutritional disorder globally, affecting an estimated 1.62 billion people worldwide, with women of reproductive age bearing a disproportionately high burden [1]. The World Health Organization (WHO) defines anemia as a condition in which the number of red

blood cells or their oxygen-carrying capacity is insufficient to meet physiological needs, which vary by age, sex, altitude, smoking, and pregnancy status. Among non-pregnant adult females, a hemoglobin (Hb) concentration of less than 12.0 g/dL is the established threshold for diagnosis [2]. In many developing nations, the prevalence of anemia among women is a major public health concern, leading to diminished work capacity, impaired cognitive function, and increased risks of adverse pregnancy outcomes, ultimately contributing to a significant cycle of malnutrition and poor health across generations [3, 4]. IDA is primarily caused by an imbalance between iron intake, absorption, and loss, with menstrual blood loss and the high iron demands of pregnancy and lactation being major contributing factors in adult women [5]. Chronic inflammation, parasitic infections, and diets poor in bioavailable iron also play significant roles in the etiology of the condition in endemic areas [6]. The consequences of IDA extend beyond physical health, impacting overall quality of life. Fatigue and weakness, the most common symptoms, directly reduce productivity and contribute to social and economic burdens at the individual, household, and national levels [7]. Despite decades of intervention programs, including mass iron and folic acid supplementation, the problem of anemia remains stubbornly high in many parts of the world, underscoring the necessity for multi-pronged and innovative approaches to prevention and management [8]. Conventional therapy focuses on oral ferrous sulfate, gluconate, or fumarate supplementation, often with folic acid and vitamin B12. However, adherence is frequently compromised by gastrointestinal side effects, and relapse can occur if underlying causes are not addressed. Long-term supplementation programs have had mixed results in India due to supply chain issues, low compliance, and poor bioavailability of some formulations. [9] Furthermore, access to sustained iron supplementation and compliance monitoring remains a challenge in low-resource settings. Consequently, there is a growing need to explore and validate effective, affordable, and accessible alternative or complementary interventions that are rooted in traditional or natural medicine systems [10]. This study seeks to investigate two such interventions: the traditional hydrotherapy technique of Cephalic Douche and the nutritional intervention of Drumstick Leaves (*Moringa oleifera*) Juice. *Moringa* (*Moringa oleifera*), often referred to as the “Miracle Tree,” holds a revered place in herbology due to its exceptional nutritional and medicinal properties. Rich in essential vitamins (A, C, and E), minerals (calcium, iron, and potassium), amino acids, and antioxidants, moringa leaves are widely recognized for their restorative and preventive health benefits [11]. In traditional herbology, moringa is classified as a rejuvenating and adaptogenic herb that nourishes the body’s tissues, enhances metabolic function, and supports detoxification. Its bioactive compounds such as quercetin and chlorogenic acid contribute to its anti-inflammatory, antimicrobial, and antioxidant activities, making it a powerful botanical for promoting holistic health and vitality [12]. In the context of Naturopathy, moringa aligns with the core principles of using natural substances to stimulate the body’s self-healing capacity. Its leaves are used to correct nutritional deficiencies, purify blood, enhance immunity, and balance doshas, thereby supporting overall systemic harmony.

As a food-as-medicine approach, moringa exemplifies the naturopathic emphasis on dietary healing, where nutrient-dense herbs are employed to prevent and manage lifestyle-related disorders such as anemia, diabetes, hypertension, and fatigue. Thus, moringa serves as both a therapeutic and preventive agent, bridging the wisdom of traditional herbology with the scientific foundations of modern Naturopathy. Cephalic douche is a specialized hydrotherapy technique in which controlled jets of water, alternately hot and cold, are directed to the head and neck region to produce therapeutic effects [13]. This treatment primarily aims to stimulate the cerebral circulation, enhance oxygen and nutrient supply to brain tissues, and promote relaxation of the nervous system. The alternating thermal stimulation induces vasodilation

and vasoconstriction, improving vascular tone and regulating autonomic balance. It is often used in naturopathy to relieve mental fatigue, headaches, insomnia, anxiety, and stress-related conditions, helping to restore mental clarity and overall neurological balance [14]. The increasing awareness of the limitations of single-strategy interventions has opened the door for integrating complementary and alternative medicine (CAM) modalities, particularly those that are low-cost and culturally acceptable. The two interventions proposed in this study represent distinct, yet potentially synergistic, pathways to address IDA: a physical therapy targeting systemic physiological improvement and a nutritional supplement addressing the foundational deficiency. This research holds significant value for public health and clinical practice. By scientifically validating the use of readily available and low-cost interventions, the findings can inform new, non-pharmacological health strategies. A demonstrated efficacy of Drumstick Leaves Juice could support its integration into national nutritional programs, offering a sustainable food-based solution. Similarly, confirming the benefits of the Cephalic Douche would add a simple, self-administered physical therapy technique to the arsenal of nursing and naturopathic care protocols. Ultimately, providing effective, complementary, and adherence-friendly options can lead to improved overall health, productivity, and quality of life for millions of adult women affected by IDA. The comparative nature of the study will also provide valuable insights into whether the intervention should focus more on direct nutritional input (Drumstick Leaves) or systemic physiological enhancement (Cephalic Douche).

Materials and Methods

The Present Study Was a Randomized Controlled Trial (Rct) Conducted Among Medical Students In An Outpatient University Health Center Setting. A Total Of 200 Participants Were Initially Screened, And 120 Participants Who Fulfilled The Inclusion And Diagnostic Criteria For Premenstrual Syndrome (Pms) Were Recruited. Participants Were Randomly Allocated Into Two Equal Groups (Intervention And Control) Using a Computer-Generated Random Number Sequence, With 60 Participants In Each Group. The Intervention Group Followed a 16:8 Intermittent Fasting Protocol Combined With Naturopathic Dietary Counseling For 21 Days, Whereas The Control Group Maintained Their Usual Dietary Habits Without Fasting During The Study Period. Pre- And Post-Assessments Of Pms Severity (Using The Menstrual Distress Questionnaire), Serum Ferritin Levels, Hemoglobin (Hb), And Fatigue (Using The Fatigue Assessment Scale) Were Performed On All Participants At Baseline And After 21 Days Of Intervention. The Study Was Carried Out At The Following Centers Under Alva's Education Foundation, Moodabidri: Alva's Education Foundation Campus, Vidyagiri, Moodabidri; Alva's Anandamaya Arogyadhama, Mijar. Alva's Niraamaya Multispeciality Ayush Hospital, Vidyagiri, Alva's Health Centre, Moodabidri.

Results

The present study titled "Efficacy of Cephalic Douche and Drumstick Leaves Juice on Iron Deficiency Anemia Among Adult Females – A Randomized Controlled Trial" was conducted to evaluate the effect of a naturopathic intervention combining *Moringa oleifera* (drumstick) leaves juice and Cephalic Douche therapy on hematological and symptomatic parameters among anemic adult females. Seventy participants who met the inclusion criteria were randomly assigned to study and control groups. Baseline and post-intervention assessments were performed for hemoglobin levels, serum ferritin levels, and fatigue scores using standardized methods. The data obtained were compiled and statistically analyzed using SPSS version 27. The results presented in this chapter summarize the within-group and between-group

comparisons, showing the effect of the intervention on the selected outcome variables, along with their statistical significance.

Table 1. Shapiro–Wilk Normality Test

Group	Variable	W Statistic	p Value	Normality
Study	FAS_Pre	0.931	0.0301	Non-normal
Study	Hb_Pre	0.907	0.0062	Non-normal
Study	SFL_Pre	0.95	0.1105	Normal
Study	FAS_Post	0.902	0.0044	Non-normal
Study	Hb_Post	0.891	0.0023	Non-normal
Study	SFL_Post	0.892	0.0025	Non-normal
Control	FAS_Pre	0.955	0.1617	Normal
Control	Hb_Pre	0.968	0.3827	Normal
Control	SFL_Pre	0.953	0.1423	Normal
Control	FAS_Post	0.924	0.0187	Non-normal
Control	Hb_Post	0.973	0.5292	Normal
Control	SFL_Post	0.948	0.0999	Normal

The Shapiro–Wilk test assessed data normality. A p-value > 0.05 indicates normal distribution. Non-normal variables were analyzed using non-parametric tests.

Table 2. Within-Group (Pre vs Post) Comparison

Group	Variable	Test Used	Statistic	p Value	Effect Size (Cohen’s d)
Study	FAS	Wilcoxon Signed-Rank	0.0	0.0	5.064
Study	Hb	Wilcoxon Signed-Rank	0.0	0.0	-1.849
Study	SFL	Wilcoxon Signed-Rank	0.0	0.0	-3.306
Control	FAS	Wilcoxon Signed-Rank	13.5	0.0	1.739
Control	Hb	Paired t-test	-6.243	0.0	-0.532
Control	SFL	Paired t-test	-11.341	0.0	-1.424

Within-group analyses (paired t-test or Wilcoxon Signed-Rank) compared pre- and post- intervention outcomes.

Significant differences (p < 0.05) indicate improvement following the intervention. Effect size (Cohen’s d) quantifies magnitude (small: 0.2, medium: 0.5, large: 0.8).

Table 3. Between-Group Post-Test Comparison

Variable	Test Used	Statistic	p Value	Effect Size (Cohen’s d)
FAS	Mann–Whitney U	11.0	0.0	-3.199

Hb	Mann–Whitney U	1104.0	0.0	1.849
SFL	Mann–Whitney U	1071.5	0.0	1.708

Independent tests (t-test or Mann–Whitney U) compared post-intervention values between groups. Significant results imply that the study group demonstrated better improvement than the control group.

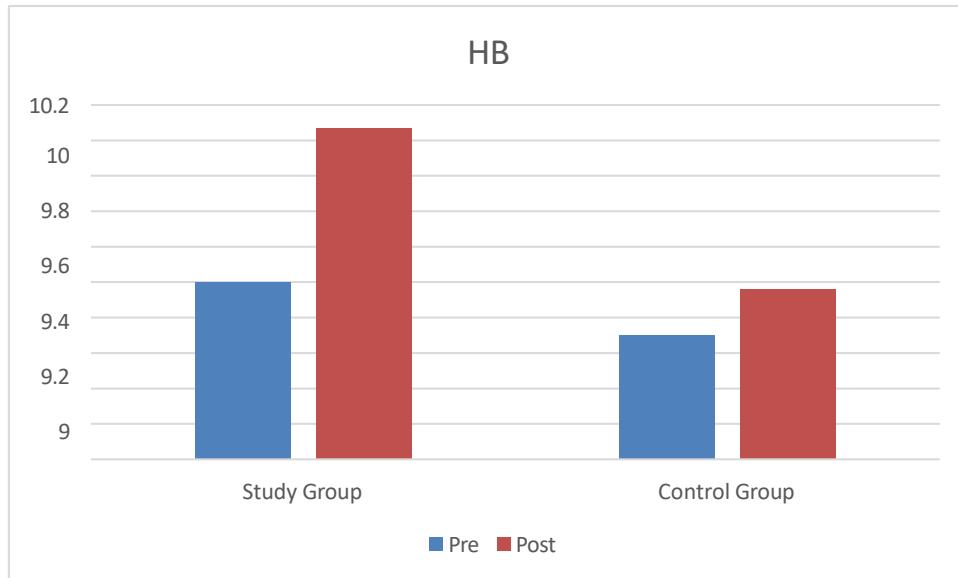


Figure 2: Pre and Post Mean Comparison of Hemoglobin concentration

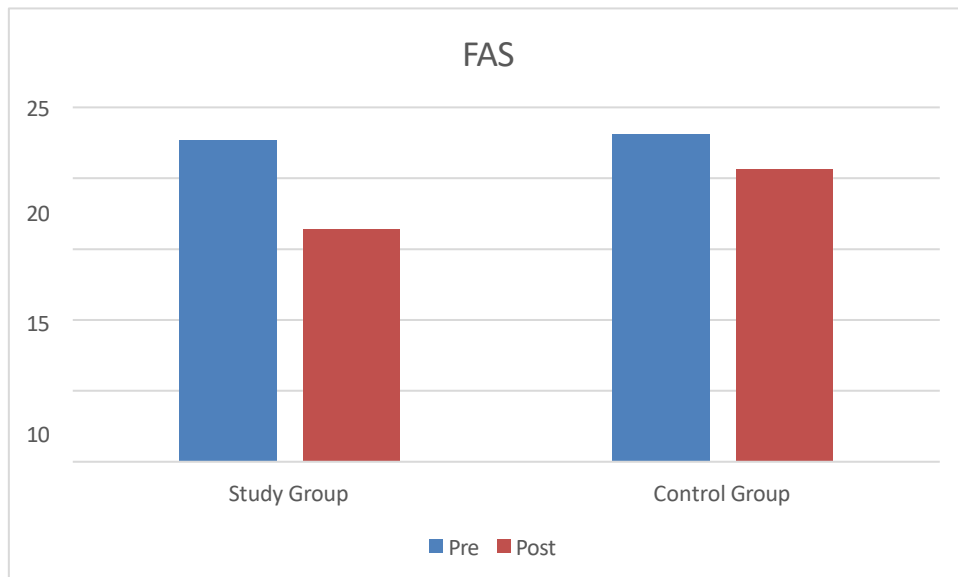


Figure 3: Pre and Post Mean Comparison of Fatigue assessments scale

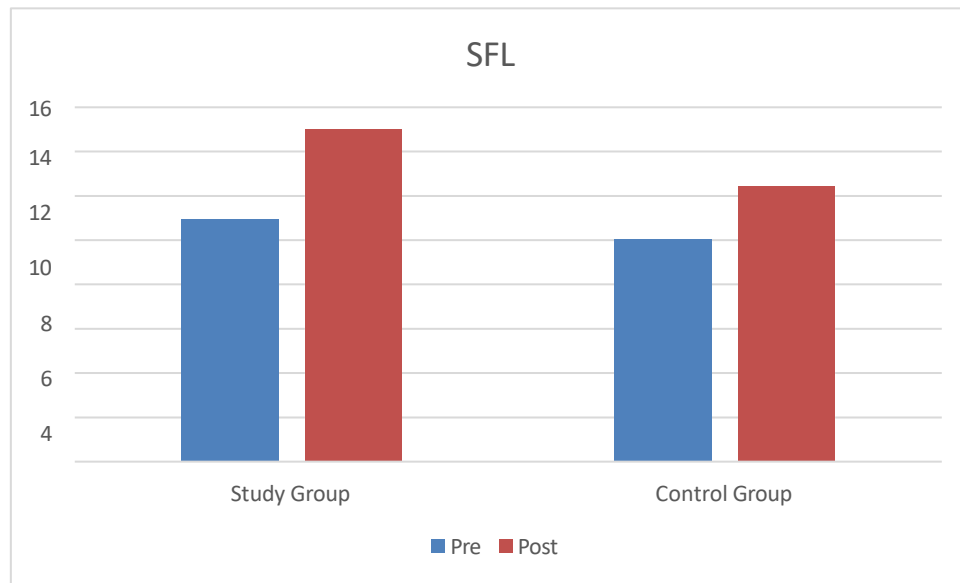


Figure 4: Pre and Post Mean Comparison of Serum Ferritin Level

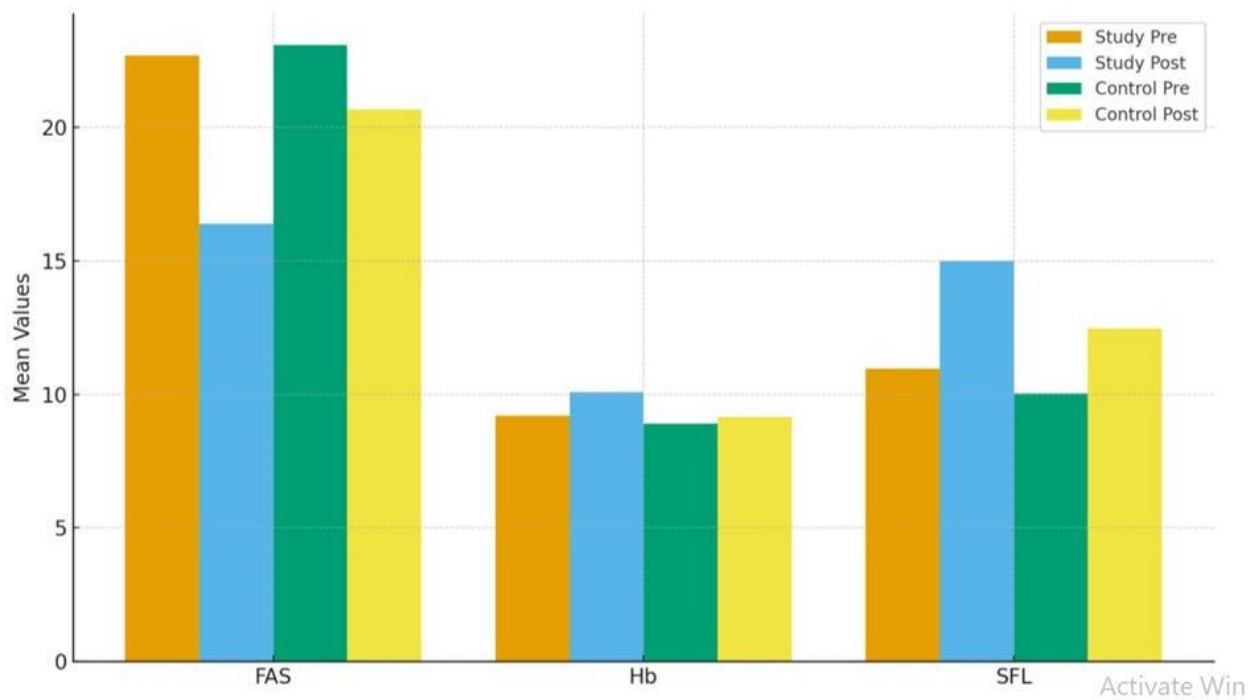


Figure 5: Pre and Post Mean Comparison

Depicts mean changes in FAS, Hb, and SFL levels before and after intervention across study and control groups. The study group shows substantial improvement (lower FAS, higher Hb & SFL), while the control group shows minimal change. This visual evidence supports the statistical outcomes that highlight the intervention’s effectiveness.

Discussion

Moringa oleifera, commonly known as the drumstick tree or “miracle tree,” is recognized for its exceptional nutritional and medicinal value. The fresh leaves and juice derived from them contain abundant micronutrients, including iron, vitamin C, folate, and essential amino acids, along with bioactive

compounds such as flavonoids (quercetin, kaempferol) and phenolic antioxidants [59]. These components together contribute to improvements in hemoglobin synthesis and reduction in fatigue through both hematopoietic and metabolic mechanisms.

The iron content of Moringa plays a direct role in the formation of hemoglobin. Iron acts as the central atom of the haem group, binding with oxygen to facilitate its transport throughout the body.[61] However, the iron in Moringa is primarily of the non-heme type, which has lower bioavailability compared to heme iron from animal sources [62]. This limitation is effectively overcome by the high vitamin C content of Moringa, which reduces ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}), the more absorbable form in the intestinal mucosa [63]. Additionally, the folate and vitamin B complex present in Moringa support erythropoiesis, aiding in the formation and maturation of red blood cells in the bone marrow. The synergistic presence of these nutrients enhances iron absorption, improves red cell production, and ultimately leads to a rise in hemoglobin concentration [64]. As hemoglobin levels increase, oxygen transport to peripheral tissues becomes more efficient. Improved tissue oxygenation reduces the state of hypoxia, a key cause of muscular and mental fatigue [65]. Therefore, one of the principal ways in which Moringa leaf juice combats fatigue is by correcting anemia and enhancing oxygen delivery, which directly improves physical endurance and cognitive performance. Clinical studies in anemic individuals and pregnant women have consistently shown that Moringa supplementation significantly raises hemoglobin levels within weeks of consumption.

In addition to its hematopoietic action, Moringa leaves exhibit potent antioxidant and anti-fatigue properties due to their rich content of polyphenols and flavonoids. These bioactive compounds neutralize reactive oxygen species (ROS) generated during metabolic processes, thereby reducing oxidative stress in muscle and neural tissues [66]. Moringa extracts also modulate key metabolic pathways such as AMP-activated protein kinase (AMPK), AKT, and STAT3, which enhance cellular energy metabolism, promote fatty acid oxidation, and increase glycogen storage in muscle and liver cells [67,68]. Experimental studies have demonstrated that administration of Moringa extract leads to lower blood lactate and urea nitrogen levels, higher glycogen reserves, and greater endurance time, all indicative of reduced metabolic fatigue [69].

Together, these mechanisms form a dual-action model. The first arm involves hematological improvement—increased iron absorption and hemoglobin synthesis leading to better oxygenation. The second arm involves metabolic enhancement—antioxidant protection and optimized energy utilization within cells. The combined result is a measurable reduction in fatigue and improved vitality. In simpler terms, Moringa leaf juice alleviates fatigue both by enhancing blood oxygen-carrying capacity and by supporting efficient energy production at the cellular level.

In conclusion, regular consumption of Moringa leaf juice provides a natural, nutrient-rich approach to improving hemoglobin levels and combating fatigue. Through its iron and vitamin C synergy, erythropoietic stimulation, antioxidant defense, and metabolic regulation, Moringa promotes both hematological health and sustained energy. This integrative mechanism justifies its traditional use as a restorative tonic for weakness and anemia, and modern evidence continues to validate its efficacy as a supportive therapy for improving hemoglobin and reducing fatigue. Hydrotherapy, in general, operates on the principle of thermal stimulation to elicit specific physiological responses, primarily through the nervous and circulatory systems [53]. The application of cold to the head, a highly sensitive area, induces a powerful reflex vasoconstriction followed by a systemic vasodilation, a process known as “reaction” or “revulsive effect” [70]. A randomized controlled trial explained the cold water at a temperature between

7°C and 21°C is applied under pressure to the lumbar region, it activates cutaneous thermoreceptors and stimulates the sympathetic and parasympathetic nervous systems in sequence. This neurovascular stimulation causes an initial vasoconstriction followed by a rebound vasodilation, improving local blood circulation in the lumbar area, which anatomically corresponds to the region of the kidneys and adrenal glands. The thermal shock also activates the renal plexus, promoting communication between the kidneys and the central nervous system. In response to this stimulation, the kidneys release erythropoietin (EPO) a hormone that acts on bone marrow to enhance the production and maturation of red blood cells (RBCs) [72]. Additionally, the temporary mild hypoxic state produced by cold exposure triggers a compensatory rise in norepinephrine, which transiently increases hematocrit and mobilizes stored red cells into circulation. With repeated sessions, the body adapts through cold acclimation, characterized by improved oxygen utilization and autonomic balance (increased parasympathetic tone) [73]. Collectively, these effects lead to an increase in hemoglobin concentration and erythrocyte count, helping improve anemia status without pharmacological iron supplementation.

Similarly to the above study The Cephalic Douche is a hydrotherapy procedure involving the brief, forceful application of cold water to the head, neck, and upper spine, a practice rooted in naturopathic and traditional healing systems [14]. When the cephalic region is exposed to cold water, it activates cranial thermoreceptors and stimulates the trigeminal and cervical sympathetic nerves, leading to reflex changes in hypothalamic activity. The hypothalamus, being the central regulator of the autonomic nervous system and endocrine axis, modulates the sympatho–adrenal and hypothalamic–pituitary–renal axes. This indirect stimulation can enhance renal perfusion and EPO secretion through central neural signaling. Additionally, the cooling of the cephalic area improves cerebral oxygenation, reduces fatigue, and enhances vagal tone, leading to better systemic circulation and oxygen delivery.

Thus, while the lumbar douche acts primarily via peripheral renal and vascular mechanisms, the cephalic douche influences central autonomic and neuroendocrine regulation, both converging on the same endpoint — improved erythropoiesis and hemoglobin levels through activation of EPO- mediated hematopoietic pathways and enhanced systemic oxygen balance. In essence, both douches use hydrothermic neural stimulation to activate physiological feedback loops that promote red cell production and oxygen transport, positioning them as complementary, non-invasive modalities in managing iron deficiency anemia.

Conclusion

Iron Deficiency Anemia remains a major public health challenge in India, particularly among women of reproductive age. While conventional iron supplementation is effective, issues with compliance and accessibility persist. Evidence supports *Moringa oleifera* as a nutrient-dense, bioavailable plant source of iron, and cephalic douche as a non-invasive hydrotherapy technique to alleviate fatigue. This randomized controlled trial will evaluate their combined efficacy on biochemical and symptomatic outcomes. Positive findings could inform cost-effective, culturally acceptable interventions for anemia management in resource-limited settings.

Strengths of the study

The present study is one of the few randomized controlled trials to scientifically evaluate the combined effect of *Moringa oleifera* (drumstick) leaves juice and Cephalic Douche therapy on Iron Deficiency Anemia among adult females. The interventions chosen are simple, low-cost, and non- pharmacological,

making them feasible for large-scale community application and integration into naturopathic practice. The study design ensured random allocation, clearly defined inclusion and exclusion criteria, and standardized procedures for data collection, which minimized selection and measurement biases. Objective biochemical parameters such as hemoglobin and serum ferritin levels, along with subjective scales like the Fatigue Assessment Scale and WHOQOL-BREF, provided a comprehensive evaluation of the intervention's impact. Ethical approval, written informed consent, and adherence to institutional and national research guidelines further strengthen the credibility and reliability of the findings.

Limitations of the study

Despite its strengths, this study has certain limitations. The relatively small sample size and short duration of intervention may restrict the generalizability of results to larger or diverse populations. The study was limited to young adult females, hence findings may not apply to other age groups or males. The control group did not receive a placebo or standard iron supplementation, which may limit direct comparison with conventional therapy outcomes. Dietary intake and lifestyle factors, though verbally monitored, were not strictly controlled and could have influenced the hematological outcomes. Additionally, long-term follow-up was not conducted to assess the sustainability of the observed improvements. Future studies with larger samples, longer follow-up periods, and multicentric designs are recommended to confirm and extend these findings.

Scope for Future Research

The combined use of cephalic douche and Moringa oleifera leaves juice may represent a novel integrative approach to IDA management. Future studies could explore:

- Longer intervention periods to assess sustainability of hemoglobin and ferritin improvements.
- Comparative trials with conventional oral iron supplementation.
- Community-based interventions for large-scale implementation.
- Mechanistic studies on hydrotherapy's role in improving fatigue and cerebral oxygenation in anemia.

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