Case Report

Pre-Operative Dietary Optimization Using Curry Leaves (Murraya Koenigii) Extract with Orange Juice in Severe Anemia: A Case Report

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ABSTRACT

Anemia is a common clinical condition frequently encountered in integrative medical practice. This case report describes the use of curry leaves (*Murraya koenigii*) extract with orange juice as a supportive dietary intervention in a patient with anemia and type 2 diabetes mellitus. The middle-aged woman with menorrhagia secondary to uterine adenomyosis, along with systemic hypertension and diabetes mellitus, with anemia, was initially unfit for surgical management. As part of integrative care, the patient was advised to consume curry leaf extract mixed with orange juice once daily in the morning for 2.5 months, along with a regular diet. Hematological parameters and glycosylated hemoglobin (HbA1c) were assessed before and after the intervention using standard laboratory methods. Following the intervention, improvements were observed in hemoglobin (Hb) levels, red blood cell (RBC) count, and other hematological indices. A reduction in HbA1C was also noted. The intervention was well tolerated, with no adverse events reported, and the patient subsequently underwent a hysterectomy successfully. This case report highlights a novel integrative dietary approach using curry leaf extract with orange juice as a treatment for anemia.

Key words: Anemia, Fruit Juices, Dietary Supplements, Case Reports.

Anemia is a global public health issue affecting all ages. According to the World Health Organization (WHO), it is defined as hemoglobin (Hb) levels <12.0 g/dL in women and <13.0 g/dL in men. However, the normal Hb distribution varies not only by sex but also by ethnicity and physiological status [1]. Based on the value of Hb, anemia can be graded as mild (10g/dl), moderate (8 to 10 g/dl), severe (6.5 to 8 g/dl), and life-threatening (markedly low) [2]. According to the recent WHO report, almost two billion people, or 25% of the world's population, have anemia. The 50% of children in underdeveloped nations and 32.8% of adolescent girls and women aged 15–49 suffer from anemia, mostly due to dietary iron deficiency [3]. In developed countries, iron deficiency anemia is most commonly caused by chronic blood loss, usually from the gastrointestinal tract or uterus [4].

Poor diet and malabsorption are rarely the sole cause of iron deficiency anemia other than chronic blood loss. In women with iron deficiency anemia, the menstrual flow rate is a leading cause [4]. The prevalence of anemia among adults over 50 years of age rises with advancing age, though the data are limited [5]. Other causes of anemia are menorrhagia, peptic ulcer, hemorrhoids, hookworm infestation, pregnancy, poor economic status, and intestinal malabsorption [6].

Traditional treatment for anemia includes erythropoiesis-stimulating medications such as intravenous iron, oral iron, and folic acid supplements (Iron Replacement Therapy), and blood transfusions [6]. However, in many cases, traditional treatments have negative consequences or are ineffective, necessitating the exploration of complementary and naturopathic treatments [7]. Based on the previous related studies, curry leaves (*Murraya koenigii*) are a rich source of magnesium, zinc, iron, and copper, enhancing iron absorption, which is dominated by the effect of ascorbic acid (vitamin C) [8, 9]. The treatments with Yoga and Naturopathy (YN) system of medicine, including diet therapy, are non- invasive [10]. Based on the principles of YN, this case report aims to describe the effect of curry leaf extract combined with orange juice, rich in Vitamin C, as a supportive dietary intervention on hematological parameters in a patient with anemia. It also seeks to highlight its role as a pre-operative integrative approach in a real-world clinical setting.

CASE PRESENTATION

A female patient, aged 49, presented at the outpatient department of S N Integrative Health Care Clinic, Vellore, with Menorrhagia for 1 ½ years. She has had systemic

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hypertension for 6 years under Allopathic medication, Diabetes mellitus for 6 months, with no medications taken. Her last bleeding was up to 20 days, and changing 3-4 pads per day. On taking obstetric history, she had 6 Gravida, 4 Parity, 4 Live, and 2 Abortions. Hepatomegaly and a bulky uterus were found in the B-mode ultrasonography of the abdomen, Kidney and Urinary bladder (KUB) and pelvis. Uterine Adenomyosis was confirmed in an endometrial pipelle biopsy. The gynecologist suggested a hysterectomy for uterine Adenomyosis and prescribed medications for heavy menstrual flow. Since the patient was affected with severe anemia, with diabetes (Hb level was 7 g/dl, and glycosylated hemoglobin A1 (HbA1c) was 6.7%), she was unfit for a hysterectomy.

After routine blood investigations, the patient was advised to consume a regular diet along with curry leaves extract with orange juice, which comes under Naturopathic nutrition, for 2 ½ months. The details and dosage of the intervention are given in Table 1.

Table 1: Details of the intervention

STEPS	DOSAGE
30 Curry leaves (7-8 grams) extract mixed with 250 to 300 ml of orange juice	For 2 ½ months in the morning, between 7 am and 9 am, before food.

After a 2 ½ month intervention period, remarkable improvements were observed. Most notably, the patient's Hb levels were increased, and HbA1c decreased. There was marked improvement in all the blood parameters, showing the effectiveness of the intervention. There were no serious adverse events recorded during the intervention. The pre- and post-outcome measures are given in Table 2.

Table 2: Haematological outcomes before and after the intervention

BLOOD PARAMETERS	BEFORE INTERVENTION	AFTER INTERVENTION
Hb	7g/dl	13g/dl
RBC (Red blood cell)	3.28 million/µL	4.74 million /µL
PCV (Packed cell volume)	24.2%	45%
MCV (Mean corpuscular volume)	73.1fL	95.1fL
MCH (Mean corpuscular Hb)	21.5 pg	29.8 pg
MCHC (Mean corpuscular Hb concentration)	29.1 g/dl	31.3 g/dl
HbA1c	6.7%	5.4%

Since the anemia and diabetes were under control after the YN intervention with regular diet and after the daily consumption of Murraya *koenigii* extract combined with orange juice over a period of 2½ months, the patient undergone Hysterectomy without any complications in May 2024.

DISCUSSION

The present case report showed a marked improvement in hematological parameters following the daily consumption of *Murraya koenigii* extract combined with orange juice over a period of 2½ months in a middle-aged woman with severe anemia and type 2 diabetes mellitus. This is the first documented clinical case report evaluating the combined use of *Murraya koenigii* extract with orange juice as a therapeutic dietary intervention for anemia, highlighting its novelty in the field of integrative and naturopathic medicine.

This combined intervention effect can improve iron absorption and increase hemoglobin synthesis, promoting erythropoiesis. The possible effect is that, on combining with vitamin C, the bioavailability of iron can be significantly enhanced. Vitamin C plays a crucial role in facilitating the absorption of non-heme iron by reducing ferric (Fe^{3+}) to ferrous (Fe^{2+}) form in the gastrointestinal tract, thereby improving its solubility and uptake. The synergistic effect of this combination offers a more effective approach for improving iron-deficiency anemia [8]. Orange juice is rich in Vitamin C, which helps to reduce oxidative stress in beta cells of the pancreas.

A wide range of phytochemicals has been isolated from the leaves, roots, stem, and bark of *Murraya koenigii*. These have yielded alkaloids, flavonoids, terpenoids, and polyphenols. Alkaloids present in the leaves have been reported to have inhibitory effects on the aldose reductase enzyme, glucose utilization, and other enzyme systems, extending anti-diabetic effects. This effect of reducing blood glucose is mediated by antioxidant properties and insulin mimetic effects. In addition, *Murraya koenigii* reduces the malondialdehyde (MDA) level by its profound antioxidant effect [11]. Rich nutritive source of *Murraya koenigii* enhances the iron absorption by its combination with Vitamin C, which overcomes the effects of all dietary inhibitors when it is included in a diet with high non-heme iron availability [9, 12].

As a single-case observation, the findings of the present case cannot be generalized and should be interpreted as preliminary evidence. As the first reported case employing this specific combination, the findings contribute novel insights to the growing body of integrative and naturopathic approaches for anemia management. The intervention was assessed in a routine clinical setting without a comparator is a limitation of this case study. While the results are promising, they should be interpreted with caution due to the inherent limitations of a single-case design. Larger, controlled clinical studies with long-term follow-up are warranted to establish efficacy, elucidate mechanisms, and define clinical applicability.

CONCLUSION

This case report provides preliminary clinical evidence suggesting that daily consumption of curry leaf extract combined with orange juice may serve as a safe, low-cost, and

potentially effective adjunctive dietary intervention for improving anemia. Clear improvement in blood parameters supports the need for further controlled studies to establish these effects and apply them clinically.

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