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Original Research Article

Efficacy of Drumstick Leaves Juice Enhances Hemoglobin in Antenatal Mother: A Natural Adjunct Approach

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Abstract: A quasi-experimental, non-equivalent control group pre-test post-test design was used to study the effectiveness of drumstick leaves juice on haemoglobin levels in antenatal mothers. Sahli's method assessed haemoglobin levels. In the experimental group, the mean pre-test haemoglobin score was 10.31, and the post-test score was 11.19. The calculated t-value (18.7) at 29 degrees of freedom ($p < 0.05$) indicated a significant difference between pre-test and post-test scores, showing an increase in haemoglobin after consuming drumstick leaves juice. The control group's post-test mean was 9.79, while the experimental group's was 11.19, with a t-value of 1.963 at 58 degrees of freedom ($p < 0.05$). This confirmed that drumstick leaves juice effectively increased haemoglobin levels. The juice is both cost-effective and easy to use.

Keywords: Drumstick leaves juice, Antenatal mother, Anaemia, haemoglobin.

1. INTRODUCTION

BACKGROUND

Anemia increases perinatal risks for mothers and neonates and increases overall infant mortality. The odds for foetal growth restriction and low birth weight are tripled, the odds for preterm delivery are more than doubled. Even a moderate haemorrhage in an anaemic pregnant women can be fatal. Moringa oleifera Lamk, is the most widely cultivated species of a mono –generic family, the moringaceae, that is native to sub Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. It is been advocated for traditional medicinal uses. All parts of moringa leaves are edible and having long been consumed by humans. It is known that the Moringa has many benefits based on its nutrition. The ratio of grams per gram, Moringa leaves dry powder contains 25 times more than in spinach, in which iron is one of the therapeutic agent.

Drumstick leaves are rich in iron and other essential nutrition necessary for iron metabolism. A 100g serving of drumstick leaves juice provides more iron than the same serving of kale, spinach or Swiss chard. Iron is notoriously difficult for the body to absorb, so it is necessary to eat foods that also include vitamins that will help your body retain iron.

India has a long history of various Government-run programmes like Integrated Child Development Scheme (ICDS), National Nutritional Anemia Control Program (NNACP), Weekly Iron and Folic Acid Supplementation (WIFS), National Iron Plus Initiative (NIPI), etc to combat anaemia. The fact is for all the programs, no marked improvement had been noticed in the enormity of anaemia. There are evidences that despite the pregnant women receiving 100 IFA tablets free of cost; the prevalence of anaemia has still remained alarming. Research reveals that the compliance rate of IFA is as low as around 30%. To overcome this, there was a strong felt need for focusing on Social and Behaviour Change Communication (SBCC) at community level.

In most of the cases, anaemia is largely preventable and easily treatable if detected in time. Effective management of anaemia includes treatment of the underlying causes, refurbishment of the haemoglobin concentration to normal levels, and prevention and treatment of complications. Despite this fact, anaemia still continues to be a common cause of mortality and morbidity among pregnant women, and data on relative contributions of associated factors are limited which makes it difficult to strongly label the problem.

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Need for the study

According to World Health Organization, the prevalence of anaemia in developing countries among pregnant women averages 56% ranging between 35-100%, in the year 2009 among different regions of the world. Various studies from different regions of the country have reported the prevalence of anaemia to be between 33-100%. In India, the prevalence of iron deficiency anaemia is perhaps the highest in the world that is 80% among pregnant women are affected.

Drumstick leaves equal to 7 times Vitamin C in oranges, 4 times Vitamin A in carrots, 4 times Calcium in milk, 3 times Potassium in banana, 2 times Protein in yoghurt, 4 times Fibre of oats, 9 times Iron of spinach. Eating drumstick leaves curry, or taking juice regularly can cure anaemia. Drumstick leaves with its high beta carotene content (19690 mcg/100g) along with vitamin C from lemon juice may have a positive impact in the mobilization of stored iron and increase haemoglobin levels of anaemia.

Iron deficiency anaemia is still a major killer for pregnant women. Experts recommends all women who are pregnant must take vitamin supplements at least 400mg of folic acid also Dietary advice should be given to all mothers to improve intake and absorption of iron from food also a women's education proved to be most important factor in reducing anaemia in pregnancy. Studies highlighting the problem of anaemia in pregnant women are very indecisive, and hence, this study was undertaken with an objective to determine the effectiveness of drumstick leaves juice among antenatal mothers with anaemia.

A study by Mishra *et al*., (2019) explored the effect of Moringa supplementation on anaemic women and found significant increases in haemoglobin levels among participants after regular intake. Similarly, research conducted by Kumari and Pandey (2020) in rural India demonstrated that the inclusion of Moringa oleifera in the diet of pregnant women led to a marked improvement in both haemoglobin and overall iron status, reducing the prevalence of anemia. These findings suggest that drumstick leaves can be an effective, affordable, and accessible intervention to address iron deficiency.

Bhattacharya *et al*., (2021) emphasized the role of vitamin C in Moringa, which enhances iron absorption, making Moringa a potent natural remedy to combat anemia in antenatal care. Studies from WHO (2020) also underscore the potential of nutrient-dense foods like Moringa to reduce maternal anemia in low-resource settings, further supporting the relevance of this intervention in antenatal populations, particularly in regions with high anemia prevalence.

Proposed Approach

This study aims to evaluate the impact of drumstick (Moringa oleifera) leaves juice on hemoglobin levels in antenatal mothers, with the primary outcome of demonstrating a statistically significant increase in hemoglobin among those in the experimental group compared to controls, highlighting its potential in addressing pregnancy-related anemia. Secondary outcomes include overall maternal health improvements such as increased energy, reduced fatigue, and enhanced nutritional profile. Safety and tolerance will be assessed to confirm if the juice is a well-tolerated option. Additionally, adherence and acceptability outcomes will provide insight into its practicality and cultural suitability in antenatal care.

The study sets a foundation for further research into other natural remedies for maternal health. It can inspire additional studies on dosage, long-term effects, and scalability in other regions, promoting a broader paradigm shift toward integrating natural supplements into health interventions.

Statement of the problem

A Study to assess the effectiveness of drumstick leaves juice on levels of haemoglobin among antenatal mothers in SMC palayam at Coimbatore district.

Aim of the Study

- To assess the pre-test level of haemoglobin among antenatal mothers in experimental and control group.
- To provide drumstick leaves juice to the antenatal mothers in experimental group.
- To assess the post-test level of haemoglobin among antenatal mothers in the experimental and control group.
- To determine the effectiveness of drumstick leaves juice on increasing the levels of haemoglobin.
- To find the association between, the post-test level of haemoglobin among antenatal mothers with their selected demographic variables**.**
- To implement the need based awareness programme on anaemia among antenatal mothers in SMC palayam, Coimbatore.

Operational Definition

- **Drumstick leaves juice -**In this study Drumstick leaves juice is prepared by boiling 1 kg of drumstick leaves with 4 litres of water and make it boil 45 minutes and strain it well.it will give 3. 5litre of drumstick leaves juice then add 2 drop of lemon juice in every 100ml of drumstick leaves juice.

Hypotheses

H_1: There will be a significant difference between the pre-test and post-test level of haemoglobin among antenatal mothers in experimental group.

H_2: There will be a significant association between the post-test level of haemoglobin among antenatal mothers with their selected demographic variables.

2. MATERIALS AND METHODS

Research Approach: This present study was done to assess the effectiveness of drumstick leaves juice to improve the haemoglobin levels of an antenatal mother. Quantitative research approach was adopted in this study.

Research Design: Research design adopted for this study was quasi experimental design.

Setting: The setting refers to the area where the study is conducted. The study was conducted in Semmanaichetti palayam of Coimbatore district. The population for the study were antenatal mothers who were residing in Semmanichetti paalayam, Coimbatore.

Sample and Sampling Technique: Sampling refers to the process of selecting a portion of population for the purpose of study based on the availability. Non probability convenient sampling technique was used in this study. The sample size for the study was 60 antenatal mothers. Among which 30 were in the experimental group and 30 mothers were in control group.

Instruments

Data Collection Instruments and instrument in research refers to the tool or equipment used for collecting data or it may take the form of questionnaire, an interview schedule or projective device for eliciting information.

Description of the tool:

Part 1: This part of tool consists of 12 items for obtaining information about the selected background factors such as 1. Age, 2. Religion, 3. Type of family, 4. Monthly income, 5. Age at menarche, 6. Pattern of menstruation, 7. Flow of menstruation, 8. Days of menstruation, 9. Gravida 10. Gestational age, 11. Type of diet and 12. Intake of beverages.

Part 2: Clinical estimation of haemoglobin level among antenatal mothers.

As per the WHO/ UNICEF, the estimation level of haemoglobin

- ✓ Normal - 12 gm % and above
- ✓ Mild anaemia - 9 to 10.9 gm%
- ✓ Moderate anaemia - 7 to 9 gm %
- ✓ Severe anaemia - < 7 gm %

Part 3:

A well-structured questionnaire which consists of 20 questions regarding knowledge on anaemia. The questions were further divided into 7 parts. General, risk factors, causes, signs and symptoms, treatment and management, preventive measures and complication.

The knowledge score was classified as follows:

- → 0 – 50% - Inadequate knowledge
- → 51 – 75% - Moderate knowledge
- → 76 – 100% - Adequate knowledge

Data Collection Process:

The permission was obtained from concerned authority, the investigator introduced herself to the respondents and the purpose of the study to the every respondents and obtained their consent. The demographic profile and the knowledge regarding anaemia was collected by using structured questionnaire. The estimation of haemoglobin level was done for the samples by using sahli's method, who fulfilled the inclusive criteria. After the pre-test drumstick leaves juice was given to antenatal mothers in the experimental group about 100 ml before food for 15 days daily. Inhibitors of iron absorption like coffee/tea were withheld during intervention. Post-test was done on 16th day after that awareness programme was given to the antenatal mothers in anaemia.

Analysis Strategies

The demographic data analysed by using descriptive statistical measures (Frequency and percentage).

1. Prevalence of anaemia and haemoglobin level were analysed by using descriptive statistical measures (Mean and Standard Deviation).
2. Effectiveness of drumstick leaves juice was analysed by using paired "t" test.
3. The association between haemoglobin level with their selective demographic variables among antenatal women were analysed by using inferential statistics (chi square- x2 test).

3. RESULTS AND DISCUSSION

The study assessing the effectiveness of drumstick leaves juice on haemoglobin levels among antenatal mothers in SMC Palayam, Coimbatore district, revealed promising results. Following the intervention, a significant increase in haemoglobin levels was observed among participants who consumed drumstick leaves juice regularly. Pre-intervention assessments showed that most mothers had haemoglobin levels below the recommended range, indicative of mild to moderate anemia. Post-intervention results indicated a measurable improvement, with the majority of participants moving into a higher haemoglobin range, reflecting enhanced iron status.

These findings suggest that drumstick leaves juice, rich in iron, vitamin C, and essential nutrients, may effectively contribute to anemia management among antenatal mothers. The study supports the potential of drumstick leaves as an accessible, low-cost nutritional supplement that can positively impact maternal health, particularly in resource-limited settings.

The study analysed demographic distributions and haemoglobin levels among antenatal mothers, with key sections comparing pre-test and post-test haemoglobin levels between experimental and control groups. Results revealed a notable increase in haemoglobin in the experimental group post-intervention. Additionally, associations between post-test haemoglobin levels and demographic factors were observed. Knowledge distribution on anaemia among participants highlighted awareness variations.

- ✓ The distribution of sample based on the demographic variables.
- ✓ Level of Haemoglobin among antenatal mothers in pre-test.
- ✓ Level of Haemoglobin among antenatal mothers in post-test.
- ✓ Comparison of pre-test and post-test level of Haemoglobin among antenatal mothers in the experimental group and control group.
- ✓ Comparison of post-test level of Haemoglobin among antenatal mothers in experimental and control group.
- ✓ Association between post-test level of Haemoglobin with selected demographic variables.
- ✓ Distribution of level of knowledge among antenatal mothers regarding anaemia.

Table 1.1: Distribution of frequency and percentage of demographic variables in experimental and control group

S. No	Demographic variables		Group			
			Experimental		Control	
			n	%	n	%
1	Age	20-25	14	46.7	10	33.3
		25-30	10	33.3	11	36.7
		30-35	5	16.7	7	23.3
		35-40	1	3.3	2	6.7
2	Religion	Hindu	25	83.3	26	86.7
		Christian	2	6.7	2	6.7
		Muslim	2	6.7	1	3.3
		others	1	3.3	1	3.3
3	Type of family	Nuclear	16	53.3	19	63.4
		Joint	12	40	10	33.3
		Extended	2	6.7	1	3.3
4	Monthly income	1000-4000	10	33.3	10	33.4
		4001-8000	6	20	7	23.3
		8001-12000	6	20	6	20
		Above 12000	8	26.7	7	23.3
5	Age at menarche	Below 13 years	3	10	2	6.7
		13-17 years	27	90	28	93.3
6	Pattern of menstruation	Regular	21	70	21	70
		Irregular	9	30	9	30
7	Flow of menstruation	Normal	18	60	15	50
		Heavy	8	26.7	11	36.7
		Scanty	4	13.3	4	13.3
8	Days of menstruation	3-5 days	16	53.3	14	46.7
		6-8 days	11	36.7	9	30
		Above 8 days	3	10	7	23.3
9	Gravida	Primigravida	24	80	20	66.7
		Multigravida	6	20	10	33.3
10	Gestational age	12-24 weeks	12	40	9	30
		24- 32 weeks	14	46.7	14	46.7
		32-40 weeks	4	13.3	7	23.3
11	Type of diet	Veg	4	13.3	4	13.3
		Non veg	26	86.7	26	86.3
12	Intake of beverages	Yes	21	70	24	80
		No	9	30	6	20

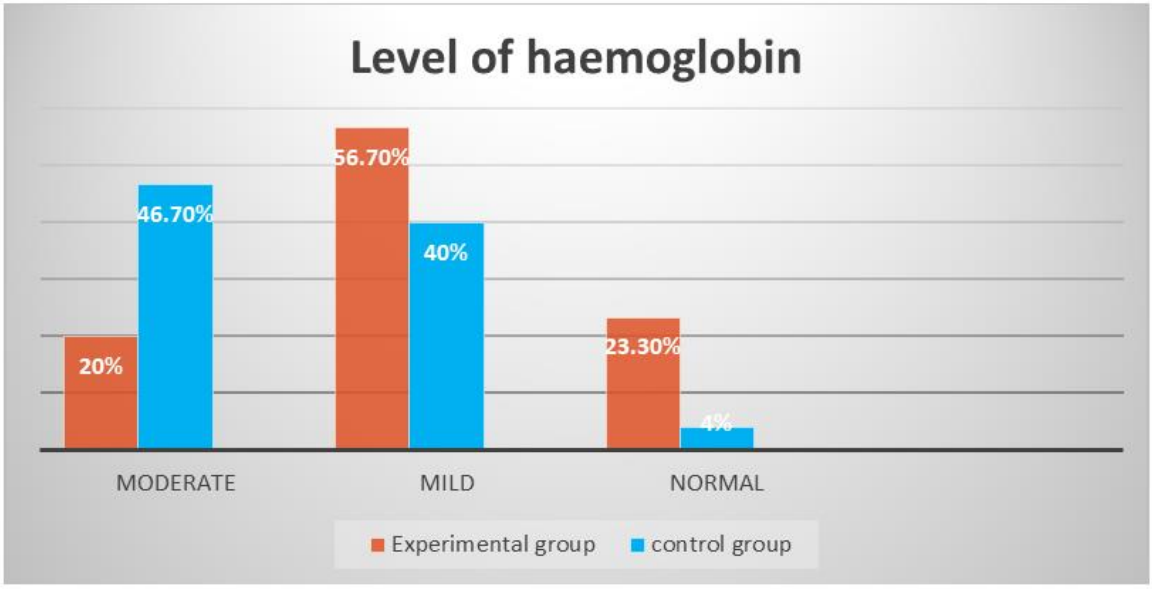

Figure 1.1: Percentage distribution of post-test level of haemoglobin in experimental and control group

Level of haemoglobin among antenatal mothers in pre-test**,** Shows the frequency and percentage of pre-test level of haemoglobin in experimental group, 2(6.7%) of them had normal haemoglobin level, 15(50%) of the had mild anaemia, 13(43.3%) had moderate anaemia. In control group 3(10%) had normal haemoglobin level, 13(43.3%) had mild anaemia, 14(46.7%) had moderate anaemia.

Level of Hemoglobin among Antenatal Mothers in Post Test I

It shows that the hemoglobin level of experimental group was increased after giving drumstick leaves juice.

Comparison of Pre Test and Post Test Level of hemoglobin among Antenatal Mothers In The Experimental Group

The calculated't' value is 1.991 at 29 degree of freedom at 0.05% level of significance, which is greater than that of table value (2.045%). It shows that there was a no significant difference between pre-test and post test score of control group.

Comparison of Post Test Level Of hemoglobin in Experimental and Control Group

It shows that the hemoglobin level of experimental group was increased after providing drumstick leaves juice. Hence alternative hypothesis is accepted.

ASSOCIATION BETWEEN DEMOGRAPHIC VARIABLES AND POSTEST LEVEL OF HAEMOGLOBIN

There is no association between the posttest level of hemoglobin with selected demographic variables among antenatal mothers in control group.

Distribution of level of knowledge among antenatal mothers regarding anemia

It shows that antenatal mother 55 (91.67%) had inadequate knowledge, 5 (8%) had moderately adequate and none of them had adequate knowledge regarding anemia.

DISCUSSION

The Effectiveness of drumstick leaves juice assessed- the mean pre-test score of experimental group is 10.31(SD=1.13) and post-test is 11.19 and (SD=1.014) The calculated 't' value is 18.7 at 29 degree of freedom at 0.05% level of significance, which is greater than that of table value (2.045%). It shows that there was a significant difference between pre-test and post test score which implied that was a significant increase in hemoglobin level after providing drumstick leaves juice.

The mean pre-test score of control group is 10.03 and (SD=1.539) and post-test is 9.79 and (SD=1.76). The calculated 't' value is 1.991 at 29 degree of freedom at 0.05% level of significance, which is greater than that of table value (2.045%). It shows that there was a no significant difference between pre-test and post test score of control group.

Based on the objective the post-test mean value of hemoglobin in experimental group was 11.19(SD=1.014) and of control group were 9.79.(SD= 1.76) The calculated 't' value was 1.963 at 58 degree of freedom and at 0.05% level of significance which is greater than table value (1.960), It shows that the hemoglobin level of experimental group was increased after providing drumstick leaves juice The drumstick leaves is effective in increasing the hemoglobin. Hence alternative hypothesis is accepted.

4. CONCLUSION

The study shows significant effectiveness of drumstick leaves juice in increasing the level of hemoglobin among antenatal mothers. This study proved that drumstick leaves juice is more effective in increasing the hemoglobin level among antenatal mothers. Drumstick leaves can be used as a cost effective method to increase the hemoglobin level. Drumstick leaves juice are rich in iron, beta carotene and other vital nutrients might be used in food supplementation to improve the hemoglobin level of antenatal mothers.

Following conclusions were drawn based on findings of the study:

The findings of the study revealed that post mean value of hemoglobin in experimental group was 11.19 and control group was 9.79. The calculated't' value was 1.963 at 58 degree of freedom and at 0.05% level of significance which is greater than table value (1.960). It shows that the hemoglobin level of experimental group was increased after providing drumstick leaves juice. Hence alternative hypothesis is accepted.

The finding of the association between levels of hemoglobin and demographical variables chi square test was used. The result revealed that there is no association between the level of hemoglobin in the demographical variables.

RECOMMENDATIONS

Similar study can be conducted for a large sample on a long term basis. Comparative study can be conducted by using various other complementary and alternative therapies to find out the effectiveness in increasing the hemoglobin level. Comparative study can be conducted between drumstick leaves juice and pharmacological treatment. Effectiveness of drumstick leaves juice can conducted on among antenatal mothers.

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DECELERATION

Author Contribution:

Authors were the sole researcher for this study and author was responsible for:

- [1,] Conceptualizing the research problem.
- [1,] Designing the study and developing the methodology.
- [1,] Conducting data collection and interacting with the selected primary schools.
- [1,2]Analysing the data and interpreting the results.
- [1,2,3]Writing and revising the research manuscript.

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Competing interest: All author declares that there are no competing financial or non-financial interests in relation to this study. All procedures followed in the research were unbiased and independent of any external influences.

Ethical Clearance:

Every procedure in this investigation complied with equivalent ethical standards. "The ethical aspect of the study has been institutionally reviewed". Informed consent has been procured by all respondents in this study.

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