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## Original Research Article

# Post-partum iron deficiency anemia: Prevalence and impact of moringa oleifera leaves powder on hemoglobin levels in postpartum period

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## ABSTRACT

**Background:** Iron deficiency anemia is a cause of concern for pregnant and lactating mother globally. As per NFHS 5 Data, 52.2% pregnant women (Both Urban and Rural) are anemic in India. Iron Deficiency Anemia is associated with maternal and neonates' mortality, restricted cognition development, low birth weight babies, Premature babies and majorly stunting which affects the nutritional status throughout the vicious cycle. Postpartum anemia is associated with an impaired quality of life, reduced cognitive abilities, emotional instability, and depression and constitutes a significant health problem in women of reproductive age. Multipronged strategies are required to curtail maternal anemia. Food based approach to prevent anemia is the most sustainable strategy.

**Objectives:** To investigate the impact of moringa oleifera leaves powder capsules on haemoglobin levels of postpartum mothers.

**Materials and Methods:** The study was conducted in one of the govt. hospitals of Vadodara District of Gujarat, India and was a part of larger study carried on M Oleifera effects on prolactin levels. An interventional study was carried out amongst 106 postpartum mothers. Fifty-six mothers constituted the interventional group of which 45 mothers did complete compliance and 50 mothers constituted the control group of which 37 mothers did complete compliance of capsules for 30 days. Hemoglobin levels were analysed on day 0 (Baseline) and on day 7 (Endline) post-partum. Data was analysed using independent t test and appropriate statistical analysis.

**Results:** Findings revealed the prevalence of iron deficiency anemia to be 59% in postpartum mothers post-delivery. Mean baseline hemoglobin values for experimental and control group was  $10.9 \pm 1.4$  g/dl and  $10.3 \pm 1.5$  g/dl respectively on day 0 post-partum. The mean end line hemoglobin values for experimental and control group were  $12.3 \pm 1.5$  g/dl and  $11.6 \pm 1.6$  g/dl respectively on day 7 post-partum. The mean rise in haemoglobin levels of experimental group was 1.4g/dl and that of control group was 0.8g/dl which was significant ( $p=0.00001$ ).

**Conclusion:** Postpartum anemia is a cause of concern. There was a significant impact of Moringa Oleifera Leaves on hemoglobin levels of enrolled lactating mothers. Thus, it can be suggested that Moringa oleifera can be supplemented to lactating mothers' post-partum to aid curtailing iron deficiency anemia. Improved haemoglobin levels in post-partum mothers may facilitate Exclusive Breastfeeding practices.

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## 1. Introduction

Iron Deficiency anemia is very much common in pregnancy. The global prevalence of iron deficiency anemia, according to UNICEF data is 49%.<sup>1</sup> As per NFHS 5 Data, 52.2% pregnant women (Both Urban and Rural) are anemic in

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India.<sup>2</sup> As per a study conducted in Karnataka, India<sup>3</sup> which reported the prevalence of anemia was 26.5%. No severe anemia cases were reported in the study. One more North Indian study<sup>4</sup> reported 70% postpartum women and one Haryana based study<sup>5</sup> reported 80% postpartum were anemic. In Gujarat, a study carried out in Devbhumi Dwarka<sup>6</sup> reported the prevalence of anemia as 26%. A study by Nadimin et. al. reported that Moringa Oleifera has significantly same effect as iron folic acid supplements on pregnant women.<sup>7,8</sup>

Iron Deficiency Anemia is associated with maternal and neonates' mortality, restricted cognition development, low birth weight babies, Premature babies and majorly stunting which affects the nutritional status throughout the vicious cycle.

Post partum it was observed that the haemoglobin levels have sudden drop due to the birth of the infant but the chances of anemia consequently drop during lactation phase due to lower requirement of infant by its birth and reduction in the blood loss causing amenorrhea.

But to its contrary, the prevalence of anemia on a large scale was seen in lactation period, making the burden of maternal malnutrition more severe and affecting the rate of exclusive breastfeeding; causing no breakage to the vicious cycle.

Multipronged strategies are required to curtail maternal anemia. Food based approach to prevent anemia is the most sustainable strategy. Moringa Oleifera is widely grown in many parts of India and is rich in various nutrients.

Studies investigating impact of moringa oleifera on haemoglobin levels of postpartum mothers are miniscule. Region specific data for consumption pattern of Moringa Oleifera is scarce. Since Moringa oleifera is an indigenous plant, it is very economical to reap its benefits.

Current study is a part of larger study where effects of Moringa Oleifera leaves powder on prolactin levels were studied. Since current study had hemoglobin levels with other biochemical parameters, data was analyzed in the context of anemia also.

Thus, the aim of the study was to investigate the impact of Moringa Oleifera leaves powder capsules on haemoglobin levels of postpartum mothers.

## 2. Materials and Methods

### 2.1. Design

A hospital based interventional study was conducted with pretest posttest with control group.

### 2.2. Site and sample

Of all the govt. hospitals of Vadodara District of Gujarat, India, one of the hospitals was selected purposively for the study due to its high delivery rates. In all 106 women who were enrolled considering their nearby locality and who

comes for ANC checkups in the selected facility and gave written consent. Out of which 50 constituted experimental group of which 45 mothers did complete compliance of the intervention and 50 constituted control group of which 37 mothers did complete compliance. Intervention was for 30 days. The distribution in experimental and control group was on random basis.

### 2.3. Target population

All mothers of age group 18-49yrs, who gave live births to full term babies in past 24hrs in the selected facility, with no medical complications were enrolled. Lactating women with medical complications like breast abnormalities or hypertension, diabetes mellitus, or any other illness that requires medication regularly were not eligible for the study.

### 2.4. Intervention

Moringa oleifera freeze dried leaves powder were obtained from a local food drying industry to avoid adulteration and to retain maximum nutritional benefits. It was encapsulated by a local pharmacy company. Each capsule contained 250mg of Moringa Oleifera. Placebo capsules containing starch powder was also manufactured in the same facility. Each capsule contained 250mg of placebo. Each bottle of intervention contained 30 capsules.

The interventional group was administered by Moringa Oleifera leaves powder capsules. Each capsule of 250 mg was given twice a day for 30 days. The control group was administered by Placebo Capsules with a dosage of 250mg twice a day for 30 days. Hemoglobin levels of mothers enrolled was assessed on day 0 (Baseline) and on day 7 (Endline) post-partum. Hemoglobin estimations were carried out in NABL accredited laboratory in Baroda.

### 2.5. Ethical consideration

Due permission was received from Institutional Ethical Committee for Human Resources with no. IECHR/FCSc/MSc/2022/32 for the study. The study is also registered in Clinical Trial Registry – India (CTRI) of Indian Council of Medical Research (ICMR) with the no. CTRI/2023/02/049402.

### 2.6. Data analysis

Data was analyzed using appropriate statistical methods. Independent t-test was performed for the study.

## 3. Results

Table 1 depicts the prevalence of anemia amongst the postpartum mothers post-delivery. Sixty % mothers (Pooled data) were anemic. Mean hemoglobin levels were 10.6g/dL.

Table 2 depicted that both experimental and control group were very much comparable in terms of Age, Parity

**Table 1:** Prevalence of anemia in post-partum mothers- 0 Day (pooled data)

Mothers with Hemoglobin levels	n=106	%	Mean (n=106) 10.6 g/dL
Normal (Greater than 11 g/dL)	44	41.5	
Mildly anemic (10-10.9 g/dL)	30	28.3	
Moderately anemic (7-9.9 g/dL)	31	29.2	
Severely anemic (<7 g/dL)	1	0.9	

and baseline hemoglobin levels of the mothers.

**Table 2:** Characteristics of experimental group and control groups at enrollment

Particulars	Experimental Group (N=56)	Control Group (N=50)
Age	24 ± 3	24 ± 3
Parity		
Primipara	28	18
Multipara	28	32
Baseline hemoglobin levels	10.9 ± 1.4 g/dL	10.3 ± 1.5 g/dL

Table 3 Shows the mean baseline hemoglobin values for experimental and control group was 10.9 ± 1.4 g/dL and 10.3 ± 1.5 g/dL respectively on pre intervention and the mean Endline haemoglobin values for experimental and control group was 12.3 ± 1.5 g/dL and 11.6 ± 1.6 g/dL respectively post intervention.

**Table 3:** Hemoglobin levels before and after intervention in the intervention and control group

Variable	N	N%	Mean hemoglobin values (g/dL)	SD
<b>Hemoglobin Level</b>				
(pre) intervention	56	50	10.9	± 1.4
(pre) control	50	32	10.3	± 1.5
(post) intervention	45	84	12.3	± 1.5
(post) control	37	56	11.6	± 1.6

Pre-intervention, 50% mothers of experimental group and 32% mothers of control group were non anemic which got increase to 84% mothers of experimental group and 56% mothers of control group post intervention.

Table 4 depicts that the 10% reduction in anemia prevalence was significant in experimental group as compared to control group (p-value 0.0005).

Table 5 highlights the mean hemoglobin rise in both the group which came as 1.4 g/dL for experimental group and 0.8g/dL for control group which was found to be significant. Therefore, it can be concluded that there was significantly

**Table 4:** Reduction in prevalence of anemia

Reduction in prevalence of anemia	% of mothers of experimental group	% of mothers of control group
Pre-intervention	50	32
Post-intervention	84.4	56.7
% Reduction	34.4	24.7 p-value= 0.0005*

\*Significant. p-value <0.05

more increase in the hemoglobin of mothers of experimental group than that of control group after compliance of M. Oleifera powder for 7 days.

**Table 5:** Mean rise in Hemoglobin levels after intervention in the intervention and control group

Variables	Mean Rise in Hemoglobin	p-value
Experimental Group	1.4g/dL	0.00001
Control Group	0.8g/dL	

#### 4. Discussions

Some Indian and Gujarat study reported that the prevalence of post-partum anemia was 26%,<sup>3</sup> 70%<sup>9</sup> and 80%.<sup>5</sup> And the study conducted in Gujarat, Devbhumi Dwarka<sup>6</sup> reported the prevalence of post-partum anemia was 26%. Whereas, in our study prevalence of anemia was 60% before intervention. Post intervention the prevalence of anemia got reduced by 34%. In experimental group 50 % mothers were having anemia of any category and in control group 68% mothers were anemic of any category which got reduced to 16% mothers in experimental group and 43% mothers in control group. Reduction of 34% of prevalence of anemia was reported in experimental group and 24% in control group which was found significant. This shows positive impact of the intervention on anemia.

#### 5. Conclusion

Based on the study conducted, it can be concluded that post-partum anemia is a cause of concern in urban setting. There was a significant impact of Moringa Oleifera leaves capsules on hemoglobin levels of lactating mothers. It can aid in curtailing iron deficiency anemia.

##### 5.1. Limitation of the study

Hemoglobin levels over the longer period of intervention i.e for 30 days was not recorded.

### 5.2. Recommendation of the study

It can be recommended that moringa oleifera leaves powder can be incorporated in THR for pregnant and lactating mothers and on the spot feeding programmes for women. It can also be supplemented in capsule form along with IFA.

### 6. Funding

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### 7. Declaration of Conflict of Interest

None declared.

### 8. Authorship Contribution

The authors equally contributed in this study.

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