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## Moringa oleifera leaves soup on hemoglobin among antenatal mothers

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**Abstract**

Anemia during antenatal is a major public health issue throughout the world, particularly in the developing countries. Green leafy vegetables are great sources of vitamins and minerals. Amongst *Moringa oleifera* is most widely used green leaf as a traditional medicine for anemia. Hence the study aimed to determine the effectiveness of *Moringa oleifera* leaves soup on hemoglobin level among antenatal mothers with anemia. Pre experimental research design with one group pre-test post-test was adopted to conduct the study with 30 samples that met inclusion criteria and were selected by purposive sampling technique. The demographic and clinical variables questionnaire was completed at the beginning of the study. Pre-test was done by checking the hemoglobin level. 100 ml of *Moringa oleifera* leaves soup was administered daily for 4 weeks. Post-test was done at the end of 4 weeks. Data were tabulated and analyzed using SPSS package. The result of the study reveals that there is statistically significant increase in the hemoglobin level at the level of  $p < 0.05$  among antenatal mothers. The findings of the study concluded that *Moringa oleifera* soup administration can be incorporated as an effective method in management of anemia and add on nutritive supplementation among antenatal mothers.

**Keywords:** anemia, antenatal mothers, hemoglobin, *moringa oleifera*, *moringa oleifera*

**1. Introduction**

Anemia in pregnancy is a major public health threat globally especially in developing countries and is associated with adverse outcomes in pregnancy [1]. Anemia is defined as a condition in which hemoglobin (Hb) level is lower than normal, which leads to decrease in oxygen-carrying capacity of red blood cells to tissues [2]. It affects all age groups, but pregnant women and children are more vulnerable. According to the WHO guidelines, anemia in pregnancy is defined as a hemoglobin level  $< 110$  g/L [3,4]. Anemia is one of the most prevalent complications during pregnancy. The causes of anemia during antenatal period in developing countries are micronutrient deficiencies of iron, folate, and vitamins A and B12 and anemia due to parasitic infections such as malaria and hookworm or chronic infections like tuberculosis and Human immune deficiency virus [5-9]. Anemia during antenatal period results in life threatening complications of both mother and fetus, such as preterm birth [10], low birth weight [11], foetal impairment, and maternal and fetal deaths [12]. It is also reported that anemia in pregnancy increase the risk of maternal and perinatal mortality [13, 14]. The antenatal care is the crucial factor for safe motherhood. The primary aim of antenatal care is to achieve healthy mother and a healthy baby at the end of a pregnancy [15]. It is important to assess hemoglobin level of pregnant women regularly for appropriate treatment and undertake preventive measures. The management of anemia in pregnancy remains a major therapeutic challenge which implies an urgent need to review strategies and treatments in order to achieve the goals and reduce the burden of care in an efficient and cost-effective way. Different strategies is practiced to supplement the iron content in the blood ranging from iron and folic acid supplementation, iron syrup, injection dextran, and blood transfusion if worse comes. Nutritional supplements are also essential to complement the medical treatments. Green leafy vegetables are great sources of vitamins and minerals such zinc, iron, potassium [16]. Amongst *Moringa oleifera* (Drumstick Tree) is most widely used green leaf from a species of a monogetic family, the Moringaceae that is native to the Sub-Himalayan part of India, Pakistan, Bangladesh and Afghanistan [17]. It is considered as a miracle tree with a great indigenous source of highly digestible proteins, calcium, iron and Vitamin C. It contains all the essential nutritional elements that are essential for human beings [18]. According to researchers *Moringa* has the potential to combat vitamin A and other micronutrient deficiencies [19]. Some articles and research studies have reported that the dry leaves of *Moringa oleifera* contain 7 times more vitamin C than orange, 10 times vitamin A than carrot, 17 times calcium than milk, 15 times potassium than bananas, 25 times iron than spinach and 9 times proteins than yogurt [20].

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In addition, it contains vitamin B-Complex, chromium, copper, magnesium, manganese, Phosphorus and zinc [21, 22]. It is easily available, cost effective, and affordable to everyone. Hence the investigators had made the observation with the hypothesis of improvement in the hemoglobin after administration of *Moringa* leaf juice among antenatal mothers. has advised to chew ginger along with salt to intensify (Sandeepan) Jatharagni and to increase appetite [10]. Chewing of ginger and salt not only increases appetite but also

## 2. Methods and Materials

Pre-experimental research design was adopted to conduct the study among antenatal mothers with anemia. It was conducted at Primary Health Centre, Chennai, after obtaining formal permission medical officer. Thirty antenatal mothers were selected for the study by using a convenience sampling technique. The participants who included in the study were in the age group between 18 and 40 years, in second trimester, had the Hemoglobin level below 10 gm/dl and with severe anemia and high risk pregnancy mothers were exclude form the study. The participants were explained about the purpose of the study and obtained the informed consent from the participants. Demographic variables and clinical variables were collected by using structured questionnaire. The pre-test

haemoglobin level was checked by using Hemoglobinometer and this measurement was standardised with the lab report. 100 ml *Moringa oleifera* leaves soup was administered daily for 4 weeks along routine antenatal. 100gm of *Moringa* leaves was used to prepare the soup. The post-test assessment was done at the end of 4<sup>th</sup> week by using the same tool. Confidentiality was assured throughout the study. The data were tabulated and analyzed by descriptive and inferential statistics using SPSS statistical package. A probability of 0.05 or less was taken as statistically significant.

## 3. Nutritive Value of *Moringa oleifera* Soup

100gm of *Moringa oleifera* leaves soup contains 0.85mg of iron, 6.7gm Protein, 1.7gm fat, 92Kcals energy, 440mg calcium, 0.8mg Niacin, 0.05mg Riboflavain, 0.06mg Thiamine and 220mg of Vitamin C.

## 4. Results

The present study observed that out of 30 antenatal mothers, 10(33.33%) were in the age group of 24 – 28 years, 16(53.34%) were under graduated, 12(40%) were house wives, 14(47%) were Christians, 21(70%) were belong to nuclear family, and 12(40%) had obtained the health information through medical personnel as depicted in Table 1.

**Table 1:** Frequency and Percentage distribution demographic variables of Antenatal mothers

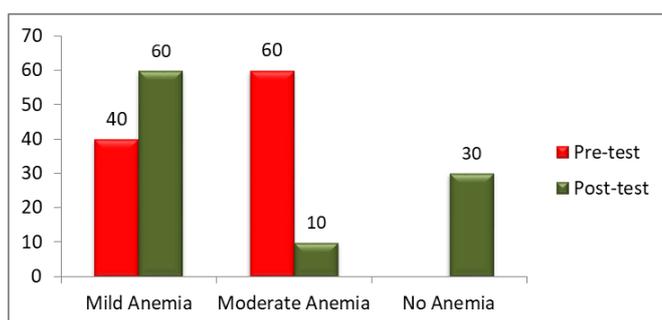
Demographic Variables	Frequency (n)	Percentage (%)
Age in Years		
19 – 23	8	27
24 – 28	10	33
29 – 33	7	23
34 – 40	5	17
Education		
School Education	7	23
Under Graduate	16	53
Post Graduate	7	24
Occupation		
Housewife	12	40
Coolie Worker	0	0
Private Employee	8	27
Government Employee	10	33
Religion		
Hindu	11	37
Christian	14	47
Muslim	5	16
Type of Family		
Joint	9	30
Nuclear	21	70
Monthly Income in Rupees		
5001 – 10,000	10	33
10,001 – 15,000	17	57
15,001 – 20,000	3	10
Above 20,001	0	0
Source of obtaining health Information		
Electronic Media	8	27
Newspaper	10	33
Medical Personnel	12	40

**Table 2:** Frequency and Percentage distribution clinical variables of Antenatal mothers

Clinical Variables	Frequency (n)	Percentage (%)
Age at Menarche (In Years)		
10 – 12 Years	10	33
13 – 15 Years	16	54
Above 15 Years	4	13
Menstrual Cycle		

Regular	30	100
Irregular	-	-
Weeks of Gestation		
13 – 16 Weeks	10	33
17 – 20 Weeks	12	40
21 – 24 Weeks	8	27
Dietary Pattern		
Vegetarian	-	-
Non- Vegetarian	30	100
Attending Antenatal Visit		
Regular	30	100
Irregular	-	-

Table 2 reveals that out of 30 antenatal mothers, 16(54%) were attained menarche between the age of 13 -15 years, and 12(40%) were in 17-20 weeks of gestation. All 30(100%) participants had regular menstrual cycle, attending antenatal visit regularly and were non-vegetarian.



**Fig 1:** Percentage distribution of Pre-test and Post-test Level of Hemoglobin among Antenatal Mothers

Figure 1 shows that in pre-test, 60% had mild anemia and 40% had moderate anemia and in post-test 40% had mild anemia, 10% had moderate anemia and 30% had no anemia.

**Table 3:** Determine the effectiveness of *Moringa oleifera* leaves Soup on hemoglobin among Antenatal Mothers

Variable	Pre – test		Post – test		Mean Difference	Paired 't' test
	Mean	SD	Mean	SD		
Hemoglobin Level	10.17	1.04	12.12	1.09	1.95	t = 13.54 df=29 P = 0.05 S*

df – degree of freedom, \*p<0.05, S – Significant

Table 3 shows that the effectiveness of *Moringa oleifera* leaves soup was analyzed by paired 't' test which revealed the pre-test mean score of hemoglobin was 10.17±1.04 and the post-test mean score was 12.12±1.09. The calculated paired't' test value of t=13.54 was found to be statistically highly significant at p<0.05 level revealing that the intervention is beneficial in raising hemoglobin level.

## 5. Discussion

Anemia during antenatal is a major public health issue throughout the world, particularly in the developing countries [23]. The present study also observed that out of 30 antenatal mothers 40% had mild anemia and 60% had moderate anemia and most of them were in second trimester of gestation with the mean age group of 27±1.23. This finding is supported by Ganesh Kumar et al who reported that out of 157 antenatal mothers 94 mothers were found to be anemic and prevalence of anemia was 59.9% [24]. Indian Council of Medical Research surveys also showed that over 70% of pregnant women in the country were anemic [25]. The every part of the *Moringa*

*oleifera* plant such as leaves, seeds, bark, roots, sap, and flowers are widely used in traditional medicine, and the leaves are commonly used as food products in human nutrition. *Moringa* leaves have been used as a wide range of vital antioxidants, antibiotics and it contains a desirable nutritional balance, containing vitamins, minerals, amino acids, and fatty acids [26-28]. *Moringa* helps to absorb more iron; therefore increasing their red blood cell count thereby it is very helpful in treating and preventing anemia and sickle cell disease [29]. There are many previous study findings proved that *Moringa oleifera* is effective in treating anemia. Considering the findings of the previous studies the present study intensively analyzed the effectiveness of *Moringa oleifera* leaves soup on antenatal anemia and observed that there is statistically significant improvement in hemoglobin level after administration of 100ml *Moringa* leaves soup for 4 weeks among antenatal mothers. The findings of the current study consistent with the study by Chrysholite Jenisha et al who demonstrated the highly significant increase in hemoglobin level after the administration of drumstick leaves soup among antenatal mothers [30]. Another study by Sindhu, et al, shows that *Moringa oleifera* with jaggery has significantly improved hemoglobin levels of anemic women [31]. Whereas in current study *Moringa oleifera* soup was prepared by using other ingredients such as pepper seeds, cumin seeds, onion and tomato. Similarly, Dona Suzana et al, concluded that *Moringa* leaves extract could improve hemoglobin, ferritin, mean capsular hemoglobin concentration, hematocrit, mean corpuscular volume in women with iron deficiency anemia after the administration of extract of *Moringa* leaves of 1400 mg was formulated in capsules daily for 3 weeks [32]. The present study is limited to investigate the hematological profile related to anemia. Nutrient analysis and bioavailability of iron in *Moringa* leaves contain protein and essential minerals however the iron levels that high enough in *Moringa* leaves have a low bioavailability (2.2%) [33]. This is due to the polyphenol content which is a potent inhibitor of iron bioavailability.20 Yang et al, stated that cooking, boiling, heating of *Moringa* leaves interact the structure of polyphenols so that iron can be free. Fresh and dried leaf powder, when boiled, will increase the bioavailability of iron respectively 3.5 and 3 times [34]. Hence the further study can be recommended to compare the bioavailability and improvement in increase the hemoglobin including hematological profile related to anemia between the *Moringa oleifera* leaves soup and powder from the extract as well to understand the mechanism of *Moringa oleifera* leaves soup.

## 6. Conclusion

The findings of the present study concluded that *Moringa oleifera* Soup is effective in improving the hemoglobin level among antenatal mothers. It is also a simple, safe, cost effective and non-pharmacological method which could be

easily prepared anybody at home and it does not cause any side effects. Hence, the *Moringa oleifera* soup administration can be incorporated as an effective method in management of anemia and add on nutritive supplementation among Antenatal Mothers. This may be promoted in the community as a prophylactic and dietary Supplementation for anemia.

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### 8. Conflict of Interest

Authors declare no conflict of Interest.

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