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## Research Article

## Prevalence and Medical correlates of Anemia in Pregnant Women visiting Janaki Medical College

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### Abstract

Anemia affects the lives of more than 2 billion people globally, accounting for over 30% of the world's population. Anemia is a global public health problem occurring at all stages of the life but the burden of the problem is higher in pregnant women particularly in developing and under developed countries. Maternal anemia in pregnancy is commonly considered a risk factor for poor pregnancy outcome and can result in complications that threaten the life of both mother and fetus. Iron deficiency in pregnancy is a predisposing factor for preterm delivery, low birth weight, stillbirth and neonatal deaths including maternal mortality risks among pregnant women. In the study incidence of anemia was estimated to obtain valuable information about the status of pregnant women visiting Janaki Medical College and Teaching Hospital (JMCTH). In addition the study insight an operational research on how to improve existing iron supplementation program in country. New and innovate strategies may improve the overall health and nutritional status of women before they enter into their reproductive phase.

**Keywords:** Iron deficiency anemia (IDA), Low birth weight, Hemoglobin (Hb), Maternal health.

### Introduction

Anemia is the most common nutritional deficiency disorder in the world. About 20% of pregnant women suffer from anemia, and most of the cases are iron deficiency, folic acid deficiency, or both [1]. Anemia in pregnancy is commonly considered as a risk factor for poor pregnancy outcome and can result in complications that threaten the life of both mother and fetus. Iron deficiency during pregnancy is a risk factor for preterm delivery subsequent low birth weight and possible inferior neonatal health [2]. It is frequently occurring medical complication in pregnancy and has a varied

prevalence, etiology and degree of severity in different populations [3]. It is defined as the concentration of hemoglobin falls below the normal range for a person's age, gender and environment resulting in reduced oxygen carrying capacity of the blood. It is also a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development [4].

The World Health Organization (WHO) estimates that two billion people over 30% of the world's populations are anemic, although prevalence rates

are variable because of differences in socioeconomic conditions, lifestyles, food habits, and rates of communicable and non-communicable diseases [5]. The lowest normal hemoglobin in the healthy non-pregnant woman is 12g/dl. The World Health Organization (WHO) recommends that hemoglobin ideally should be maintained at or above 11.0 g/dl, and should not be allowed to fall below 10.5 g/dl in the second trimester [6]. According to WHO, the diagnosis of anemia during pregnancy is established when Hemoglobin (Hb) level is below 11 g/dl, this being the borderline between "physiologic anemia during pregnancy" and true anemia during pregnancy [4]. WHO further classified anemia in pregnancy into mild (Hb 10.0 - 10.9g/dl), moderate (Hb 7.0 - 9.9g/dl) and severe (Hb < 7.0g/dl) [7]. It occurs in all stages of life, but is more prevalent in pregnant women and young children. Anemia in pregnancy is considered one of the major risk factors contributing to maternal death in developing countries [2]. Hemorrhage, eclampsia and infections being the three major causes of maternal deaths in Nepal [8]. Since it reduces resistance to blood loss, death may occur from bleeding associated even with normal delivery. Association of anemia with adverse maternal outcome such as puerperal sepsis, antepartum hemorrhage, postpartum hemorrhage and maternal mortality is no longer a debatable issue [9]. Many studies on anemia during pregnancy are well documented, showed prevalence of anemia 62.2% out of which 3.6% with severe [10]. The study was carried out to estimate the incidence of anemia to obtain valuable information about the status of pregnant women for safe delivery, as it is one of the most predisposing factors for preterm delivery, low birth weight, stillbirth and neonatal deaths including maternal mortality risks among pregnant women. In addition the study approaches blood bank services for providing blood to anemic women during delivery for those categorized as unresponsive to treatment.

## Materials and Methods

The present study was conducted on patients visited or admitted in Obstetrics and gynecology OPD and IPD at Janaki Medical College and Teaching Hospital (JMCTH) Janakpur, Nepal. A total of 200 pregnant women were selected

randomly with age ranging from 16 - 42 years. from October 2012 to March 2013 and blood samples were collected and processed in the Department of Biochemistry, JMCTH for Hemoglobin status and other relevant findings. The research protocol was approved by the institutional ethical committee.

## Sample Collection and Processing

In this cross-sectional study venous blood samples were withdrawn in EDTA additive tubes with written consent from each participant. Samples were analyzed for Complete Blood Count (CBC) by Five-Part Differential NHANES 2003–2004 manual [11] and General Blood Picture (GBP) with laboratory standard procedure [12].

## Data analysis

A standardized questionnaire was used to record obstetrical and medical characteristics on pregnant women. The responses for the questions with the laboratory test results of CBC and GBP readings were entered into pre-designed SPSS (version 18.0) software to facilitate data analysis. Different parameters were compared using cross tabulation and complex data analysis program. Wherever necessary Chi-square test and P-value were applied to verify results.

## Results

Out of the 200 participants 9 (4.5%), 140 (70%), 51 (25.5%) were in the first, second and third trimester respectively. Distribution of the obstetric and medical characteristics of the pregnant women is tabulated. The obstetric and medical characteristics of the pregnant women are shown in Tables 1 and 3. In multivariate analysis, the only variables that were significantly associated with anemia were gestational age, previous miscarriage/abortion, chronic diseases, history of previous surgeries and history of hemorrhoids.

## Obstetrical characteristics of the pregnant women

Three cases (1.5%) of our study population were found to have 4 miscarriages, and the remaining

149 (74.5%), 39 (19.5%) and 9 (4.5%) were found to have nil or 0, 1 and 2 miscarriages respectively. Out of the total study population 33 (16.5%) had taken iron tablet. Twenty six of the 33 pregnant women had taken iron within one

month before the collection of blood. Only 2 (1%) pregnant women had taken multivitamin containing folic acid within one month before the collection of blood shown in Table 3.

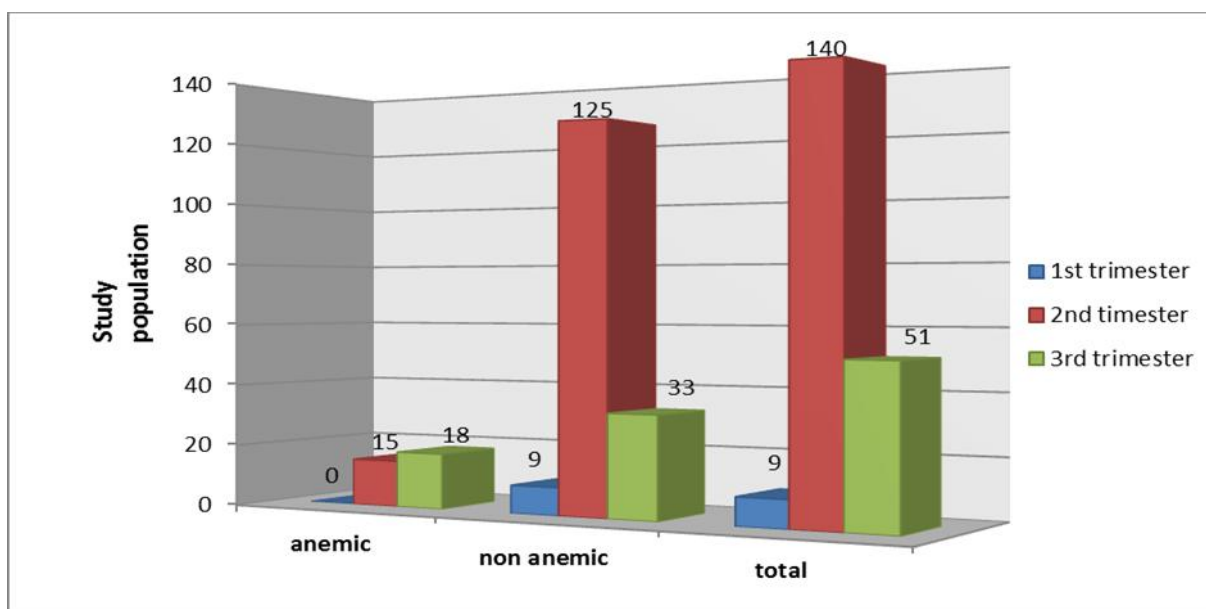
**Table 1: Obstetrical history of participants during pregnancy.**

Variables	n (%)
<b>Children</b>	
Zero	62 (31)
One	56 (28)
Two	41 (20.5)
Three	20 (10)
Four	6 (3)
>Four	15 (7.5)
<b>Previous cesarean section</b>	
Yes	17 (8.5)
No	183 (91.5)
<b>Miscarriage/abortion</b>	
Zero	149(74.5)
One	39(19.5)
Two	9(4.5)
Four	3(1.5)
Iron intake	33 (16.5)
Folic acid intake	2 (1)

**Laboratory finding of anemia**

Out of total participants, 33 (16.5%) were found to be anemic, 23 (11.5%) were mildly and 7 (3.5%) were moderately anemic. Three cases

(1.5%) of severe anemia were noted. Among the anemic pregnant women the breakup of anemia was 70% mild, 21% moderate and 9% of the severe variety shown in Figure 1.



**Figure 1: Relationship between gestational age (in trimester) and anemia**

### Morphological finding

Further investigations of RBC morphology and red cell indices were involved in order to rule out the types of anemia. Of the anemic pregnant, 30.3% had a microcytic-hypochromic anemia (MCV < 80 fl & MCH < 27 pg), 27.3% had a normocytic-normochromic (MCV and MCH within normal range), 6% had a macrocytic (MCV > 99.9 fl) anemia and 36.4% had combined

morphologic type of anemia. In the clinical impression that the morphological analysis guided by the questionnaire asked and the complete blood count (CBC) show that Iron deficiency anemia was the most frequent (66.7%) case. Two cases (6%) of macrocytic-hypochromic were reported as megaloblastic anemia. And the remaining (27.3%) accounted for normocytic-normochromic anemia (Table 2).

**Table 2: Morphological finding**

Morphological finding	n (%)
Microcytic-Normochromic	3 (9.1)
Microcytic-Hypochromic	10 (30.3)
Normocytic-Normochromic	9 (27.3)
Normocytic-Hypochromic	9 (27.3)
Macrocytic-Hypochromic	2 (6)

**Table 3: Incidence of anemia according to obstetrical characteristics**

Variable	Anemia		Total	P Value
	Present	Absent		
<b>Gravidity</b>				0.156
One	4	47	51	
Two	9	41	50	
Three	8	34	42	
Four	8	19	27	
five	4	26	30	
<b>Miscarriages/abortion</b>				0.029
Zero	20	129	149	
One	10	29	39	
Two	1	8	9	
Three	0	0	0	
Four	2	1	3	
five	0	0	0	
<b>Children/parity</b>				0.779
Zero	10	52	62	
One	9	47	56	
Two	6	35	41	
Three	5	15	20	
Four	0	6	6	
five	3	12	15	
<b>Trimester</b>				0.001
1 <sup>st</sup>	0	9	9	
2 <sup>nd</sup>	15	125	140	
3 <sup>rd</sup>	18	33	51	
<b>Previous cesarean section</b>				0.218
Yes	1	16	17	
No	32	151	183	

## Obstetrical characteristics on anemia

In this study previous miscarriage/abortion was statistically significant with anemia ( $p < 0.05$ ). Number of anemic women with previous miscarriages or abortion had higher incidence than those non anemic women with history of miscarriages or abortion. Pregnant women with four occurrences of miscarriage/abortion 3 (1.5%) had two cases of anemia 2 (1%). Out of total pregnant women, 9 (4.5%), 140 (70%), 51 (25.5%) were in the first, second and third trimester respectively. The finding reveals that second and third trimesters shows high incidence

of anemia i.e. 15 (7.5%), 18(9%) respectively but in the first trimester no anemia cases were found.

## Medical characteristics of the pregnant women

Pregnant women with chronic diseases were 12 (6%). Some of the chronic diseases included liver disease, Malaria or HIV. Pregnant women, who had undergone surgery, previously were 20 (10%). Out of those, 17 pregnant women had cesarean and the remaining 3 women had undergone other types of surgeries. 19 (9.5%) pregnant women respond “yes” to history of hemorrhoids. 70 (35%) women out of the study population were with peptic ulcer.

**Table 4: Incidence of anemia according to medical characteristics**

Variable	Anemia		Total	P Value
	Present	Absent		
<b>Presence of chronic diseases</b>				0.001
Yes	7	5	12	
No	26	162	188	
<b>Hemorrhoids</b>				0.002
Yes	8	11	19	
No	25	156	181	
<b>History of previous surgeries</b>				0.018
Yes	2	1	3	
No	31	166	197	
<b>Peptic ulcer</b>				0.076
Yes	16	54	70	
No	17	113	130	
<b>Multivitamins intake</b>				0.528
Yes	0	2	2	
No	33	165	198	
<b>Folic acid intake</b>				0.528
Yes	0	2	2	
No	33	165	198	

## Discussion

The study reveals, the incidence of anemia among pregnant women is 16.5%. Incidence of anemia in pregnancy varies from one country to another and from one region to another. The percentage breakup of anemia among anemic pregnant women was 70% mild, 21% moderate and 9% of the severe variety. Previous studies conducted in rural Jordan found out that the prevalence of anemia among pregnant women was 34.7% (0.1%

severe, and 31.7% mild anemia) [13]. The study compare with Enugu, South Eastern Nigeria the prevalence of anemia was 40.4%.The majority of these anemic patients were mildly anemic (90.7%), whereas 9.3% were moderately anemic. There was no case of severe anemia [14]. All the above results show that mild anemia is the most incidental cases of all. This might be due the physiologic anemia that occurs in pregnant women.

### Obstetrical characteristics on anemia

Gravidity and parity were not significantly associated with anemia. This is consistent with the findings of Lama Al-Mehaisen et al. in which parity was not a significant predictor of Hb concentration [13]. Similarly, Dim and Onah found that maternal age and parity had no statistical relationship with the prevalence of anemia at booking in a Nigerian population [14]. There was a statistically significant relationship between previous miscarriage/abortion and anemia ( $p < 0.05$ ). Number of anemic women with previous miscarriages or abortion had higher incidence than those non anemic women with history of miscarriages or abortion. This may be due to bleeding. The incidence of anemia in this study increased with increased trimester of pregnancy. This finding is consistent with the findings of Lama Al-Mehaisen et al [13]. Here most anemic cases were found to be in the second and third trimesters. This may be due to an increased demand for micronutrients during the last trimester and depletion of body iron reserve; this is in contrast to the finding of Cyril C. Dim et al [14]. This study found that there was high incidence of anemia among women who had not taken iron, folic acid and multivitamin.

### Medical characteristics on anemia

In context to the history of hemorrhoids, it was significantly associated with the incidence of anemia ( $P < 0.05$ ). This finding was in complete contradiction with the study of Lama Al-Mehaisen et al [13]. The histories of hemorrhoids taken were considered to be less than one year. In this multivariate analysis previous surgery was found to be statistically significant as a possible cause of anemia. This finding and another study conducted in rural Jordan by Lama Al-Mehaisen et al [13] were alike. This strong association between previous surgeries and history of hemorrhoids with anemia might be due to recurrent bleeding following pregnancy. But it's also prudent to remember that abnormal menstruation before pregnancy could be one of the reasons why. Chronic illness such as liver diseases, malaria and HIV show, they were statistically significant in causing maternal anemia ( $p < 0.05$ ). A study conducted in Kisumu,

Kenya by Timothy Thomas et. al. show that antiretroviral (ARV) drug, Zidovudine (ZDV), is known to cause anemia [15]. Plasmodium species dwelling in host red blood cells are known to cause anemia followed by hepatomegaly complications.

### Morphological finding

This study evidently stated that most of the anemia were normocytic-normochromic (27.3%) and, 30.3% were microcytic-hypochromic and 2 cases (6%) were macrocytic anemia. It was stated in the literature that folate and B12 vitamin deficiencies caused macrocytic anemia, however concurrent presence of iron deficiency resulted in normocytic anemia. Similar results were generated when compared to the study in east Anatolian province of Turkey [16]

### Conclusion

The study concluded moderate anemia problem in pregnant women in JMCTH i. e. (16.5%) and one sixth of women conceive pregnancy with anemia, gestational age (second and third trimesters), previous miscarriage/abortion, presence of chronic diseases and history of hemorrhoids and surgeries were the main predictors of anemia. The main morphologic type of anemia was microcytic-hypochromic (30.3%). Hence, preconception care, including iron and folic acid supplementation, is advocated to reduce and overcome this problem. Continuing of daily iron with folate supplementation in the beginning of pregnancy and food aid programs towards pregnant women is recommended.

During pregnancy, efforts should be pampered up toward the early detection and treatment of anemia before delivery. All these efforts would help to ensure safe motherhood. An operational research on how to improve existing iron supplementation program in country is needed. New and innovate strategies are required that may improve the overall health and nutritional status of women before they enter into their reproductive phase.

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## References

1. Kozuma S. Approaches to Anemia in Pregnancy. *JMAJ* 2009; 52(4): Page no 214–218,
2. AbouZahr C, Royston E. Maternal mortality. A global fact book. WHO, Geneva 1991.
3. Schwartz WJ. Schwartz WJ, Thurnau GR. Iron Deficiency Anemia in Pregnancy. *Clin. Obstet. Gynecol* 1995; 38: 443- 454.
4. World Health Organization. Nutritional Anemia's: report of a WHO Scientific Group. Geneva, Switzerland: 1968, Tech Rep Series 405.
5. WHO. Micronutrient deficiencies. Iron deficiency anemia. [www.who.int/www.who.int/nutrition/topics/ida/en/index.html](http://www.who.int/www.who.int/nutrition/topics/ida/en/index.html). Published 2011. Accessed 2011.
6. World Health Organization. Prevention and management of severe anemia in pregnancy. Report of a Technical Working Group, Geneva, 20–22 May 1991.
7. World Health Organization. Prevention and management of severe anemia in pregnancy. Report of a Technical Working Group, Geneva, 20–22 May 1991. Maternal Health and Safe Motherhood Programme, Geneva: WHO; 1993.
8. Murphy JF, O'Riordan J, Newcombe RJ, Coles EC, Pearson JF. Relation of hemoglobin levels in first and second trimesters to outcome of pregnancy. *Lancet* 1986; 1:992–995 .
9. Roy S, Chakravorty PS. Maternal and perinatal outcome in severe anaemia. *J Obstet Gynaecol Indian* 1992; 42: 743- 50.
10. Bonevik9Bondevik GT, Ulstein M, Lie RT, Rana G, Kvale G. The prevalence of anemia in pregnant Nepali women- a study in Kathmandu. *Acta Obstet Gynecol Scand* 2000; 79: 341-9.
11. Complete Blood Count (CBC) with Five-Part Differential NHANES (([National Health and Nutrition Examination Survey](http://www.cdc.gov/nchs/nhanes.htm)))[www.cdc.gov/nchs/nhanes.htm](http://www.cdc.gov/nchs/nhanes.htm) 2003–2004
12. Blood Preparation, staining, evaluation of the blood smear. Microscopy of the peripheral blood smear. [www.cdc.gov/dpdx/resources/pdf](http://www.cdc.gov/dpdx/resources/pdf)
13. Lama Al-Mehaisen, Yousef Khader, et al. The prevalence of maternal anemia in rural Jordan; 2011.
14. Cyril C. Dim, MBBS (Nig), Senior Registrar and The Prevalence of Anemia Among Pregnant Women at Booking in Enugu, South Eastern Nigeria; 2005.
15. Timothy T, Masaba R. Prevalence of Anemia among Women in a Trial of HAART including Zidovudine for PMTCT in Kisumu, Kenya 2006; pp. 748.
16. Leyla Karaoglu, Erkan Pehlivan et al. The prevalence of nutritional anemia in pregnancy in an east Anatolian province, Turkey; 2010.