

# Anemia in Pregnancy a Study of Karachi in a Tertiary Care Centre

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## ABSTRACT

Anemia is one of the common medical conditions in pregnancy. The World Health Organization (WHO) describes anemia in pregnancy as hemoglobin levels less than 11.0 g/dl. According to the 2008 report of WHO, 1.62 billion (24.8%) people are affected globally from anemia. This situation is more serious in developing countries where around 60% of the pregnant women are anemic. Objective of the study was to determine the prevalence of anemia in pregnancy at the Liaquat National Hospital, Karachi, a tertiary care center. A Hospital based study was designed, where women delivered at the Liaquat National Hospital, Karachi between the periods June 2012 to June 2013 were enrolled in this study.

Hemoglobin was assessed for all pregnant women categorized as anemic on the basis of severity. Data was gathered with regard to their antenatal progress and factors influencing anemia in pregnancy. Descriptive statistics was done and the Chi square test was performed to examine the relationship between outcome variables (anemic/no-anemic) and other independent variables. One hundred and twenty (24%) pregnant women were found anemic. Among these seventy two were mild anemic (60%), while thirty percent (36) were moderately anemic and remaining twelve (10%) were severely anemic. Seventy seven percent was identified to have iron deficiency anemia. Anemia was significantly related with lower age group (18 - 29 years), low income, greater family size, underweight and previous history of anemia. The study showed that iron deficiency anemia is the most common cause of anemia in pregnancy and is a chief public health issue in developing countries.

**Keywords:** Anemia, Hemoglobin, Iron deficiency, Pregnancy

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## INTRODUCTION

Anemia is one of the common medical conditions in pregnancy.<sup>1</sup> The

World Health Organization (WHO) states anemia in pregnancy as hemoglobin levels

less than 11.0 g/dl.<sup>2</sup> (WHO, 1968). It is a main public health issue in developing countries where around 60% of pregnant women are anemic.<sup>3</sup> According to the 2008 report of WHO, 1.62 billion (24.8%) people are affected globally from anemia.<sup>4</sup> It had an estimated global prevalence of 42% in pregnant women and is a major cause of maternal mortality.<sup>5</sup> In Africa, 57.1% of the pregnant women were anemic. Although frequency differs widely in different settings and accurate data is often missing, however in areas with limited facilities significant proportions of childbearing women are anemic.<sup>6</sup> Geographically, those living in Asia and Africa are at the greatest risk.<sup>7</sup> Moreover, there is also a large variation in the incidence of pregnancy anemia because of the changes in socioeconomic conditions, lifestyles, and health seeking behaviors of various individuals across different countries and cultures and obstetrics and gynecological related situation of pregnant mothers.

Anemia may be due to several reasons, although it is supposed to be mainly caused by iron deficiency in developing countries. Deficiency of other micronutrient e.g. vitamins A and B12, riboflavin, and folic acid have also been a cause of anemia during pregnancy.<sup>8</sup> Likewise; communicable diseases, e.g. malaria, helminthes infestations and HIV are also involved with high prevalence of anemia in sub-Saharan Africa.<sup>9</sup>

The effect of anemia throughout the pregnancy ranges from varying degree of morbidity of mortality, since severe anemia (Hb < 7g/L) during pregnancy has been related to major maternal and fetal complications. It increases the risk of preterm delivery, low birth weight, intrauterine fetal death, neonatal death, maternal mortality and infant mortality.<sup>10,11</sup>

Since anemia during pregnancy has harmful consequences, WHO accepted,

reducing maternal mortality as one of the three healthiest-related millennium development goals, hence international community is working within this framework to reduce maternal mortality by three quarters at the end of 2015.<sup>12</sup>

The data regarding prevalence of anemia remains an important indicator of public health since it is one of the important causes of morbidity and mortality in the population groups usually considered to be the most vulnerable like pregnant women. Universally anemia prevalence is a useful indicator to assess the impact of widespread or highly effective interventions and to track the progress made towards the goal of reducing anemia during pregnancy.<sup>13</sup> Anemia occurrence study is also useful to monitor the progress of reproductive health.<sup>14</sup> Despite the efforts made to reduce the burden, its incidence has not yet been studied comprehensively in developing countries. Pakistan is not an exception, where there has been no recent published data on the occurrence of anemia in pregnancy. This study was hence carried out to investigate the incidence, risk factors, intrapartum, postpartum and perinatal outcome of women with anemia in pregnancy.

## PATIENTS AND METHODS

The study was carried out at the Department of Obstetrics and Gynecology, Liaquat National Hospital, Karachi, between the period from June 2012 to June 2013, with the following inclusion and exclusion criteria.

### Inclusion criteria

- Pregnant women in twelve to twenty five weeks of gestation.
- Known date for the beginning of the last menstrual period.
- Systolic blood pressure less than 140 mm Hg.

- Diastolic blood pressure less than 90 mm Hg.
- Intention to be delivered at Liaquat National Hospital.

#### Exclusion criteria

- Pregnant women previously given birth with malformation.
- Multiple pregnancies.
- Polyhydramnios.

Hemoglobin level was first estimated for all women enrolled in the study, then blood sample was collected for various other test, e.g. blood count; serum iron, folic acid, vitamin B12, ferritin, transferrin and red cell zinc protoporphyrin levels and thalassemia establish the cause of anemia.

#### Assessment of anemia

Hemoglobin (Hb) cut off value adjusted to sea level altitude was used to define anemia on the basis of gestational age and to classify the degree of severity using WHO criteria. The Hemoglobin value less than 11.0 g/dl at first and third trimesters and less than 10.5 g/dl at second trimester was used to define anemia. Based on the severity, women with hemoglobin value of (10 g/dl ≤ Hb < 11g/dl) at first and third trimesters and (10 g/dl ≤ Hb < 10.5 g/dl) at second trimester were classified as mild anemic. Pregnant women having an Hb value of (7 g/dl ≤ Hb < 10g/dl) and (Hb < 7g/dl) were categorized as moderate and severe anemic, respectively, regardless of their gestational age.<sup>15</sup>

#### Ethical clearance

The study was permitted by an institutional review board of Liaquat National Hospital. The reason and importance of the study were explained to each participant. Written consent was taken from each woman. To ensure privacy of participants, anonymous typing was used whereby the name of the participants and

any participants' identifier were not written on the questionnaire, and even participants were interviewed alone to retain the privacy. Results were communicated with clinicians working in the ANC unit for appropriate management.

#### Data analysis

The categorical variables (i.e. Anemic/non-anemic, severity of anemia, etc.) were shown as proportions (percentage), and the continuous variables were shown as mean ± SD. The categorical variables were compared using a chi-square test, while continuous variables were compared using the independent t-test between the anemic and non-anemic pregnant women. P-values less than 0.05 were considered as statistically significant. All data were analyzed using SPSS version 19, statistical analysis software.

## RESULTS

#### Prevalence and severity of anemia

500 pregnant women were engaged during the study to determine the occurrence of anemia and its severity. One hundred and twenty (24%) pregnant women were found anemic (Fig. 1). Among these 120 anemic women, majority, seventy two (60%) were mild anemic. Thirty six (30%) were moderately anemic, while the remaining twelve (10%) were severely anemic (Fig. 2)

#### Causes of anemia

Among 120 anemic women at delivery, 93 (77%) were found to have iron deficiency anemia. Folic acid deficiency was found only in 3 (2%) pregnant anemic women. 11% had combined iron and folic acid deficiency, while 3 (2%) of the anemic women at delivery were found to have thalassemia. A total of 11 (8%) showed a combination of iron deficiency with some other cause. (See figure 1 and 2.)

### Comparison of sociodemographic characteristics between anemic & non-anemic pregnant women

The age categories, maternal education status, occupation, family income and family size were compared between anemic and non-anemic pregnant women. Significant differences were found between age categories, family size and family income between the two populations. The results showed that pregnant women less than 29 years were more anemic (68%) as compared to (61%) in the non-anemic group. The p-value was significant with P-value < 0.01. Moreover, greater proportions of pregnant women were anemic with low family income (61% vs. 22%; p-value < 0.01). Importantly, a greater proportion of pregnant women were anemic with greater than or equal to 5 family size (47% vs. 21%; p-value < 0.01) (see table 1).

### Comparison of obstetric and medical factors between anemic & non-anemic pregnant women

The gravidity, body mass index, occupation, previous history of anemia, IUGR (Intrauterine Growth Retardation), pre-term delivery, APH (anti-partum hemorrhage), PPH (postpartum hemorrhage), were compared between anemic and non-anemic pregnant women. Significant differences were found between body mass index and previous history of anemia. The results showed that seventy four percent of the underweight, pregnant women were anemic, compared to sixty seven percent of underweight pregnant women who were non-anemic. The p-value was significant with less than 0.01. Importantly, a greater proportion of pregnant women in the anemic group had a history of previous anemia (22%) compared to 4% in the non-anemic group; with p-value < 0.01). There was no significant difference in the APH, PPH, mode of delivery and maternal mortality (table 2).

### Hemoglobin level at booking

The mean hemoglobin concentration at booking was 11.1 g/dl for women enrolled in the study as compared to a mean hemoglobin level of 11.5 g/dl at delivery (P<0.001). One hundred and twenty (24%) were found to be anemic from total 500 pregnant women enrolled in the study at the first antenatal visit, while 85 (71%) remained anemic at delivery. (See table 2.)

### Neonatal outcome

There were 512 deliveries during the period of study among the pregnant women enrolled. No statistical difference in sex distribution, congenital malformations, stillbirth rate and neonatal death rate were found among the anemic and non-anemic groups. There was a tendency towards smaller babies for a decreasing hemoglobin level, but the correlation was not found to be significant. The incidence of IUGR diagnosed after delivery was 6% and 3% for the anemic and non-anemic groups respectively. This difference was not statistically significant (P = 0.30).

## DISCUSSION

Among these 500 pregnant women, twenty four percent (120) pregnant women was founded anemic. Thus, the overall prevalence of anemia identified in this study was 24%. This incidence was nearly close to studies conducted in Trinidad and Tobago (15.3%)<sup>16</sup>, Thailand (20.1%)<sup>17</sup>, Zurich (18.5%)<sup>18</sup>, Hawassa (15.3%)<sup>19</sup>, and Gondar town (22%)<sup>20</sup>. The prevalence of anemia stated in this study was noticeably lower than previous study reports from Malaysia (35%)<sup>21</sup>, Jordan (34.7%)<sup>22</sup>, Vietnam (43.2%)<sup>23</sup>, South eastern Nigeria (76.9%)<sup>24</sup>, Eastern Sudan (62.6%)<sup>25</sup>, and Ethiopia (38.2%)<sup>26</sup>. The probable cause accounted for the difference in the incidence of anemia may be due to geographical variations. Importantly the findings of our study are recent, and since

last decade considerable attention has been paid towards the severity of issue. There has been steady improvement of life style and living standards and health seeking behavior by the effort of government to achieve the Millennium development goal aimed to reduce the maternal mortality to three-quarter by the year 2015.

The five main etiological factors for anemia in pregnancy worldwide are: iron deficiency, folate deficiency, malaria, hemoglobinopathies and AIDS.<sup>27</sup> The finding of this study documented that the iron deficiency was the commonest cause of anemia, accounting for 77% of all women. The second common cause was a combined iron and folate deficiency which constituted 11% of anemic women at delivery.

In this study the higher occurrence of anemia was present in pregnant women less than 29 years of age. This is not much of a surprise as surprising as pregnancies below 20 years of age are teenage pregnancies which are often not planned or wanted pregnancies. Moreover, the nutritional status of the teenage mother has often not been optimal and nutritional anemia is common in teenage pregnancies.<sup>28,29</sup> The prevalence of anemia, decreased until the age of 40 years, beyond which the prevalence increased again. This is perhaps linked to increasing parity, nutritional status and health of the mother. Parity and the birth interval between pregnancies are the most obvious factors linked to anemia in pregnancy and there is no doubt that the higher the parity, and the closer the interval between pregnancies, especially below 18 months, the higher the risk of developing anemia in the present pregnancy. However the relationship between parity and anemia was not found significant.

Evidence from the literature suggested that anemia in pregnancy is associated with a higher occurrence of preterm delivery and intrauterine growth retardation resulting in low birth weight babies.<sup>30-32</sup> The results of this

study indicated that a higher incidence of preterm delivery for the anemic women (7% vs. 5%) compared to non-anemic women.

Finally, several studies have found an association between the maternal hemoglobin level and the birth weight of the baby<sup>33-34</sup>. Generally there is an inverse relationship between the severity of anemia and the birth weight of the baby. The findings of this study also documented that mothers giving birth to lighter birth weight babies were more severely anemic, but the results were not significant. Moreover, a greater proportion of anemic women reported IUGR compared to non-anemic women.

#### Limitations of the study

One of the limitations of this study was the nature of the study design. Being a cross-sectional study, it did not reveal results about the temporal association (i.e. risk factors responsible for developing anemia). Moreover, the study was conducted at one tertiary care setting (Liaquat National Hospital), where majority of study participants enrolled were from urban areas. Thus the findings of the study could not be generalized to the pregnant population of Pakistan as the majority of these women resides in the rural settings, areas where access to antenatal facilities is imperfect, hence the occurrence of anemia would have been even more if the study could have been carried out in the general population.

#### CONCLUSION

Anemia in pregnancy remains a common problem in Pakistan, with a prevalence of 22% in our study. The most common cause of anemia is still an iron deficiency (nutritional) anemia, accounting for about 77%. Thus, it is recommended that all pregnant women should be encouraged to book early for antenatal follow-up. All pregnant women should have a hemoglobin estimation at their first antenatal visit and be



given iron supplements in pregnancy. Moreover, regular follow-up for hemoglobin should be followed at every antenatal visit. Importantly, women with high risk of developing anemia should have repeat hemoglobin estimation at 30 to 34 weeks gestation to identify their response to treatment and decide if parenteral iron was necessary. Lastly, there is an immense need to conduct a large community based study to determine the incidence and predictors of anemia in the general population of pregnant women.

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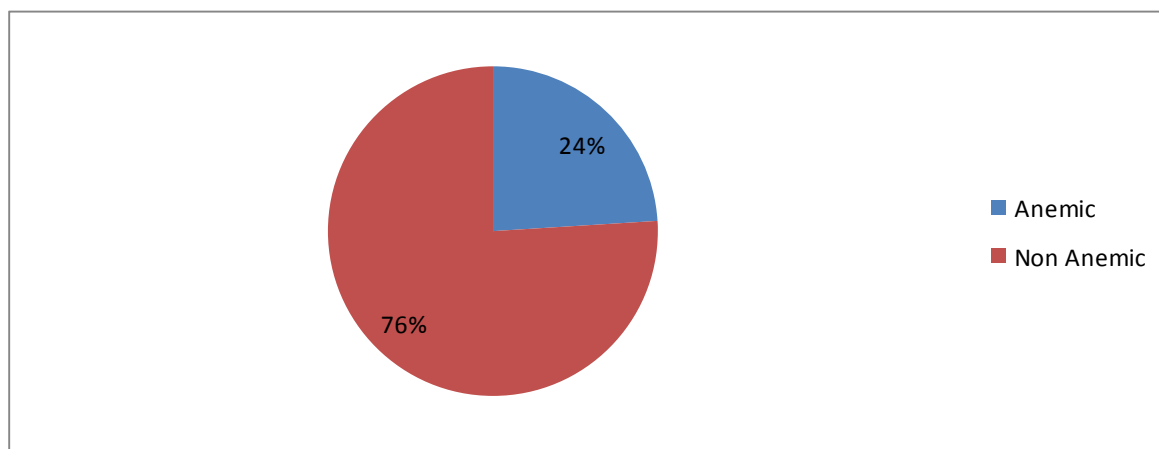
**Table 1.** Comparison of sociodemographic characteristics between anemic & non-Anemic women

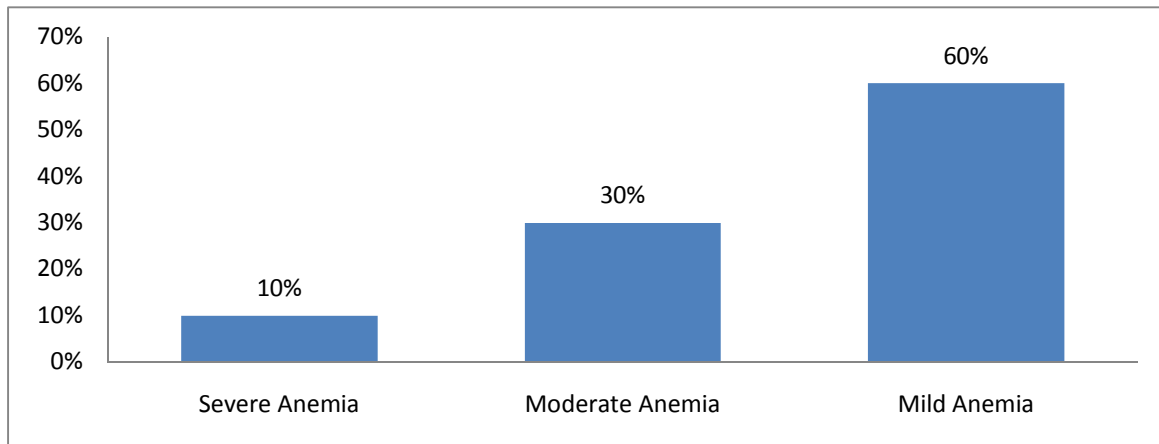
Characteristics	Anemic (N = 120)	Non-anemic (N = 380)	P-value
<b>Age categories</b>			
18 - 29 years*	38 (68)	232 (61)	0.001
Greater than 29 years	82 (32)	148 (39)	
<b>Maternal education status</b>			
Illiterate	17 (14)	27 (7)	0.383
Primary School	24 (20)	87 (23)	
Secondary School	38 (32)	152 (40)	
Tertiary	41 (34)	114 (30)	
<b>Occupation</b>			
House wife	78 (65)	231 (61)	0.288
Govt. Employed	14 (12)	65 (17)	
Other	28 (23)	84 (22)	
<b>Family income</b>			
Low*	73(61)	84 (22)	0.001
Middle	25(21)	171 (45)	
High	22(18)	125 (33)	
<b>Family size</b>			
≤ 2*	26 (22)	197 (52)	0.001
3 -4	47(39)	103 (27)	
≥ 5	47 (39)	80 (21)	



**Table 2.** Comparison of obstetric and medical factors between anemic and non-anemic pregnant women

Characteristics	Anemic (N = 120)	Non-anemic (N = 380)	P-value
<b>Gravidity</b>			
Primigravida	36 (30)	152 (40)	0.06
Multigravida	84 (70)	228 (60)	
<b>Body mass Index</b>			
Underweight*	31 (74)	255 (67)	0.001
Normal and Above	89 (34)	125 (33)	
<b>Previous history of anemia</b>			
Yes*	26 (22)	13 (4)	0.001
No	94 (78)	367 (96)	
<b>IUGR</b>			
Yes	7 (6)	11 (3)	0.30
No	123 (94)	369 (97)	
<b>Preterm delivery</b>			
Yes	8 (7)	19 (5)	0.58
No	108 (93)	361 (95)	
<b>APH</b>			
Yes	5(3.5)	11 (3)	0.70
No	115(96.5)	369 (97)	
<b>PPH</b>			
Yes	0 (0)	8 (2)	0.24
No	120 (100)	372 (98)	

**Figure 1.** Prevalence of anemia



**Figure 2.** Percentage of anemia by severity