Original Article

Fetal Outcome in Anaemic and Non Anaemic Pregnant Women

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Abstract

Objective; To compare the fetal outcome of anaemic pregnant women with matched nonanaemic pregnant women.

Study Design; Cohort study.

Place and Duration of Study; Department of obstetrics and gynaecology unit I, Jinnah Hospital, Lahore from 1-3-2013 to 30-9-2013.

Methodology; Non-probability/purposive sampling technique was used;2 groups were compared including booked pregnant women between 20-35 years of age with parity up to 5 while un booked pregnant women with anaemia due to chronic disease or due to structural abnormality were excluded.

Results; A total of 410 patients were registered in the study with mean age of 25.3 with SD of 4.4yrs with a mean hb of 10.3g/dl with SD of 1.49 g/dl, there were 64.9% females with more than one pregnancy, preterm birth was seen in 33.42% with a significant p value0.35 and LBW was in 23.6% patients with a significant p value of 0.049, APGAR score <7 were in 53.6% with significant p value of 0.043 and still birth was seen in 7.07% with a nonsignificant p value of 0.004

Conclusion; Anaemia is still a major health problem as well as clearly indicating that maternal anaemia is an indicator of adverse pregnancy outcome.

Key Words; Anaemia, fetal outcome, preterm birth, LBW. APGAR score, still birth.

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Introduction

Anaemia in pregnancy is one of the important condition and a main public health issue of women of developing countries. Throughout the world approximately 41.8% pregnant women have anaemia during their pregnancy as opposed to 30.2% of women not pregnant yet. Among the regions of World Health Organization, South-East Asia constitutes 48.2% and Africa has 57% of pregnant women who are anemic and these regions are the most severely affected regions in the world. It is estimated by WHO that globally more than 50% of pregnant women are anaemic with their haemoglobin level (<11.0 gm/dl), the prevalence, however, is as high as 56-61% in developing countries.[1]

In Pakistan, it is common to see pregnant women with severe anaemia presenting at third trimester and without any prenatal care, most of these pregnant women are from a very low socioeconomic status.[2] In one study done by Baig et al approximately 90.5% of pregnant women were found anaemic in an urban setting in Pakistan of whom

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0.7% were severe anaemic.[3]

There is however significant variation in the prevalence of anaemia among pregnant women in different regions of the country and in comparison, with neighbouring countries that demand good estimates of anaemia in order to update our existing programmes on prevention of anaemia among pregnant women.[4]

Anaemia in pregnancy is a serious health problem not only for the mother but also for the child as there is a direct relation between growth and development of neonates during pregnancy. There is a significant maternal morbidity and mortality due to anaemia and also perinatal outcome is compromised, it can also predispose to preeclampsia, infections and postpartum haemorrhage.[5] Intrauterine growth retardation, higher rates of preterm births and low birth weight babies are significantly associated with maternal anaemia and there is a higher perinatal morbidity and mortality and increased infant mortality rate. There is more than 3-fold increase in the perinatal mortality rate with almost doubling of low birth weight among pregnant women with Hb of <8gm/dl.[6]

The cohort of LBW (birth weight<2.5kg) babies is likely to reflect two effects, namely short gestational age (preterm birth) and small for gestational age (SGA). The risk of preterm delivery increases significantly with severity of anaemia with ORs of 1.4, 1.4& 4.1 for women with mild, moderate and severe anaemia respectively , compared with women with normal haemoglobin level, which was16.6% for mild,15.8% for moderate and37%for severe anaemia as compared to normal Hb group having 12.4% preterm births.[7] In a study preterm birth, LBW, and SGA was seen in severely anaemic mothers as 23.5%, 29.6%, and 27.8% respectively, as compared to controls(normal Hb>11.0g/dl) as 10.2%, 14.5%, and 8.2% respectively, the percentage of still birth was 9.2% in anaemic and 3.6% in non-anaemic pregnant women and APGAR score less than 7 was seen in 11.1.% in anaemic and 4.5% in non-anaemic. The frequency of anaemia was 69.9% and that of severe anaemia was 4.8%.[2]

In a study, the prevalence of anaemia increases from 43.7% to 89.8% in 30 years. Infants born to women with anaemia were 82 gms heavier than infants of non-anaemic women. Women with anaemia in pregnancy were less likely to have stillbirths (0.8%)and preterm births (3.7%) as compared non-anaemic women having1.2% still births &5.7% preterm births after adjustment for potential confounders. Women who had anaemia during pregnancy had about a 50% lower risk of still births than non-anaemic.[8]

Diminished intake and increased demands of iron, disturbed metabolism, pre pregnancy health status and excess iron demand as in multiple pregnancies, women with rapidly recurring pregnancy, blood loss during labour, heavy menstrual blood flow, inflammation and infectious diseases are important factors which lead to the development of anaemia during pregnancy.[9] The most common cause is iron deficiency anaemia, other causes include infections, folic acid and vitamin B12 deficiency.[10] Pregnant (and consequently lactating) women are amongst the highest group at risk for iron deficiency.[11]

To control iron deficiency anaemia diet modification practices and food fortifications are needed. Oral iron supplements are required and suggested when dietary modifications are either not providing the normal requirements, alternatively, when there is increased demand for which diet alone is not sufficient to maintain iron stores. Recent recommendations to provide iron supplements suggests intermittent iron.[12]

Early detection of anaemia during pregnancy and starting treatment among pregnant women is now accessible and affordable at all level of health care system in country and an effective implementation of these measures even at primary health care settings is cost effective and benefit interventions.[6]

Anaemia in pregnancy is a treatable disease and the most neglected by the pregnant women. There is a high prevalence of anaemia among pregnant women and as a consequence, the complications of pregnancy are also quite high. The relationship between anaemia and adverse outcome have been inconsistent, some studies have shown anaemia to be significantly associated with the risk of adverse outcomes where as others have not. This study shows how much is the contribution of a preventable cause (anaemia) in the complications of pregnancy

by comparing the fetal outcome in pregnant anaemic women with non-anaemic pregnant women. This will help to formulate guidelines for both prevention and correction of anaemia.

Methodology

A sample size of 410 cases is calculated with 80% power of test, 5% level of significance and taking expected percentage of APGAR score <7 in both groups i.e 11.1% in anaemic group versus 4.5% in non-anaemic group of pregnant women. 205 in each group.

Sample selection:

2 groups compared;

Group 1 anaemic mothers (Hb<11g/dl)

Group 2 non-anaemic mothers (Hb>11g/dl)

Inclusion criteria;

- Parity up to 5.
- Age between 20-35.
- Booked patients admitted for delivery after age of viability(28 weeks onwards)

Exclusion criteria;

- Pregnant women having anaemia due to structural abnormality of Hb (assessed by blood tests)
- History of antepartum haemorrhage or postpartum haemorrhage in previous pregnancies.
- Chronic diseases like TB or malignancy will be assessed on history clinical examination and laboratory test.

Operational definition:

Anaemia: Anaemia was defined as pregnant women with Hb<11g/dl in the last trimester

Mild anaemia (Hb9.0-10.9g/dl), moderate(Hb7.0-8.9g/dl) & severe(Hb<7.0g/dl).

Outcome: Following outcome will be assessed in the study:

Fetal Outcome

- Preterm birth <37 weeks by dates.
- Low birth weight<2500gms.
- Still birth(baby delivered with no sign of life).

APGAR score <7 measured by 5 parameters as,

Apgar Scale (evaluate @ 1 and 5 minutes postpartum)				
	Sign	2	1	0
A	Activity (muscle tone)	Active	Arms and legs flexed	Absent
P	Pulse	>100 bpm	<100 bpm	Absent
G	Grimace (reflex irritability)	Sneezes, coughs, pulls away	Grimaces	No response
A	Appearance (skin color)	Normal over entire body	Normal except extremities	Cyanotic or pale all over
R	Respirations	Good, crying	Slow, irregular	Absent

Data collection procedure: The obstetric history, history of previous pregnancy and their outcome were also recorded. History regarding time of diagnosis and treatment taken is noted. Gestational age was calculated by dates "Neagles rule". Fetal outcome such as birth weight, preterm birth, still birth and APGAR score were recorded for the both groups. All this information was collected on a pre-designed Proforma (annexure).

Data Analysis Procedure: The collected data is entered and analyzed in SPSS software (version 17.0). The following variables are analyzed as age, gestational age at delivery and presented by mean and standard deviation. Frequency and percentages are calculated for qualitative data like preterm birth, low birth weight and still birth and APGAR score <7. Fetal outcome is compared of anaemic and non-anaemic women groups by using chi-square test.

Results

The mean hemoglobin was 9.27±0.93 gm/dl for group A and 11.58±0.96 for group B, the minimum for group A was 5.8 mg/dl, maximum was 10.7 mg/dl and for group A 11mg/dl and 14 mg/dl. (Table I)

Table I: Descriptive Statistics for Haemoglobin

	Treatment Group		Total
	Group-A	Group-B	
N	***205***	***205***	***410***
Mean (Hb)	9.27 gm/dl	11.58 gm/dl	10.43 gm/dl
SD	0.93	0.96	1.49
Minimum	5.8	11	5.8
Maximum	10.7	14	14

Group-A= *Anaemic* ***Group-B=*** *Non-Anaemic*

Among anaemic mothers pre-term birth was seen in 73 neonates while in non-anaemic mothers 64 preterm births were observed. p-value is not significant hence there is no significant association between preterm birth and anaemic and non-anaemic mothers. (Table II)

Table II: Distribution of Preterm Birth in Anaemic & Non Anaemic Pregnant Women

		Group		Total
		Group-A	Group-B	
Preterm Birth	**Yes**	73(35.60%)	64(31.22%)	137(33.42%)
	No	132(64.40%)	141(68.78%)	273(66.58%)
Total		**205**	**205**	**410**

Group-A= Anaemic Group-B= Non-Anaemic
p-value= 0.35 (p-value>0.05)

Among anaemic mothers 56 neonates had low birth weight while in non-anaemic mothers 41 neonates had low birth weight. p-value showing no significant association between Birth weight and anaemic and non-anaemic mothers. (Table III)

Table III: Distribution of fetal birth weight in anaemic & non anaemic pregnant women

		Group		Total
		Group-A	Group-B	
Birth Weight	**Low**	58(28.29%)	41(20%)	97(23.66%)
	Normal	147(71.71%)	164(80%)	313(76.34%)
Total		**205**	**205**	**410**

Group-A= Anaemic Group-B= Non-Anaemic
p-value= 0.049 (p-value<0.05)

Among anaemic 22 (10.73%) and non-anaemic mothers 7(3.41%) neonates had still birth. It was observed that among anaemic mothers rate of still birth was high as compared to non-anaemic mothers. p-value showing a significant association between anaemic and non-anaemic mothers in relation to still birth (Table IV)

Table IV: Still Birth in Anaemic & Non Anaemic Pregnant Women

		Group		Total
		Group-A	Group-B	
Still Birth	**Yes**	22(10.73%)	7(3.41%)	29(7.07%)
	No	183(89.27%)	197(96.59%)	381(92.93%)

Table IV: Still Birth in Anaemic & Non Anaemic Pregnant Women

		Group		Total
		Group-A	Group-B	
Still Birth	**Yes**	22(10.73%)	7(3.41%)	29(7.07%)
	No	183(89.27%)	197(96.59%)	381(92.93%)
Total		**205**	**205**	**410**

Group-A= Anaemic Group-B= Non-Anaemic
p-value= 0.004 (p-value<0.05)

In anaemic mothers 106 (51.70%) had APGAR score <7 and in non-anaemic mothers 114(55.60%) had APGAR score <7. P-value showing insignificant association between APGAR score with anaemic and non-anaemic mothers. (Table V)

Table V: APGAR<7 (1-Min) in Anaemic & Non Anaemic Pregnant Women

		Group		Total
		Group-A	Group-B	
APGAR <7	**Yes**	106(51.70%)	114(55.60%)	220(53.66%)
	No	99(48.30%)	91(44.40%)	190(46.34%)
Total		**205**	**205**	**410**

Group-A= Anaemic Group-B= Non-Anaemic
p-value= 0.430 (p-value>0.05)

Discussion

Anemia in pregnancy is a major public health issue. Almost half of pregnant women are anemic in developing countries and among them 20% of the maternal deaths is due to anemia as a direct or indirect cause. WHO criteria for anemia of pregnancy is of <11.0 gm/dl of hemoglobin and a haematocrit value of < 33.o%.[13] Anemia during pregnancy is a serious health issue because it directly effects growth and development of fetus. 56% of pregnant women are suffering from anemia in developing and these figures are even higher in the Central Asian countries where In India its almost 80.0%.[14] Anemia is one major cause of maternal and perinatal morbidity and mortality. Pregnant women are predisposed to maternal infections, postpartum hemorrhage and preeclampsia due to anemia. Generalized symptoms like body aches and easy fatigability are more common among pregnant women.

In our country, the most common causes of anemia during pregnancy are poor socio-economic conditions like illiteracy, lack of health seeking behavior, multiple pregnancies, gender discrimination and parasitic infestation. Several studies in Pakistan have shown that iron deficiency is a major factor for the development of anemia during pregnancy.[15] The prevalence of Anemia in pregnant women in Pakistan range from 8.0% - 33.0%, and there is an increased risk of low birth weight and intrauterine growth retardation.[16]

It was observed that high prevalence of anaemia among pregnant women and as a consequence, the complications of pregnancy are also quite high. Some studies have shown anaemia to be significantly associated with the risk of adverse outcomes where as others have not.

In this study pre-term birth was observed in 73(35.60%) anaemic and 64(31.22%) non anaemic mothers. The frequency of preterm birth was high in anaemic mothers as compared to non-anaemic mothers but this was not statistically significant. Low birth weight, Still birth and APGAR score <7 in this study was observed as 58(28.29%), 22(10.73%) and 106(51.7%) in anaemic mothers. For these fetal outcomes, only low birth weight and still birth were significantly associated with anaemic status of mothers while preterm delivery and APGAR score <7 was insignificantly associated with anaemic & non anaemic status of mothers.

Jaleel in his study reported Preterm birth in 23.5% cases and 10.2% in controls (p-value=0.026). Of the severely anaemic mothers, 29.6% babies were low birth weight (p-value= 0.022), 27.8% were small for gestational age (p-value = 0.001) and in utero death was 9.2% (p-value=0.157) as compared to 14.5%, 8.2% and 3.6% of non anemic mothers respectively.[2]

A study from Nepal conducted by Ghimire shows significant association of anaemic mothers with fetal outcome. APGAR score <7 was 18% in anaemic and 5% in non anaemic group (p-value=0.0039). Intrauterine fetal death was 6% in anaemic and none of the non anaemic mothers had Intrauterine fetal death (p-value=0.0128). Frequency of low birth weight was 22% in anemic and 9% in non-anemic mothers (p-value=0.011).[17]

In a study by Badshah et al[16] evaluated that the predicted incidence rate for low birth weight among new born is high among Tribal areas of Pakistan in anemic mothers, that was statistically significant (p <0.01) as compared to mothers that were non anemic. The study showed that there was a increased risk of small for gestational age infants among mothers with anemia as compared to non-anemic counterparts. These findings were also consistent with results of study by Mavalankar et al done in Ahmedabad, India among pregnant women with anemia and low fetal birth weight.[16,18]

A local study from Rawalpindi reported the number of low birth weight infants (64%) was highly significant in the anemic mothers than the non-anemic (10%).[5]

The outcome in my study was also comparable with the results of these studies. In my study majority of anemic pregnant women gave birth to babies that were having low birth weight babies, as compared to the non-anemic group and results were statistically significant. Preterm birth and APGAR score <7 was quite high in anemic mothers as compared to non-anemic mothers this findings is consistent with the results reported by Jaleel[2] and Ghimire[17] but in this study no significant association was seen for these two fetal parameters in terms of the anemic and non-anemic status of mothers.

Another local study done by Bakhtiar from Rawalpindi reported risk of preterm and Low birth weight among anemic women was 3.4 (62/402) and 1.8(41/402) times more than non-anemic women. The neonates of anemic woman also had 1.7(35/402) times increased the risk of having low Apgar scores at 1 min. Among anemic women, there were 2.2(11/402) times greater risk of intrauterine fetal death than the non-anemic women.[19]

There is a compromised transport of hemoglobin in iron deficiency anemia resulting in decrease oxygen to uterus, placenta, and fetus coupled with dysfunction of tissue enzymes and cellular dysfunction. This explains an impaired myometrial contractility which results in atny of the uterus and placental dysfunction leading to premature birth, LBW, growth retardation and increased risk of perinatal deaths. There is an impaired wound healing due to reduced oxygen delivery.[20]

Several researches have been carried out to comprehend how anemia during pregnancy may predispose to a preterm labor and an increased risk of infection. The direct effect is linked to an increased synthesis of corticotrophin releasing hormone (CRH) as a consequence of tissue hypoxia. This increase CRH induces maternal and fetal stress and there by a pose a risk factor for preterm labor, preeclampsia and premature rupture of the membranes. There is also an increase in fetal cortisol level due increase in mother corticotrophin releasing hormone (CRH) which may impede the longitudinal growth of the fetus. An alternative explanation for this could be that low iron level increases oxidative damage to erythrocytes in the feto–placental unit that in turn stimulate the release of CRH. These irregularities in CRH regulation and production of inflammatory cytokines also impede activities of natural killer cells both in vivo and in vitro.[21-23]

The burden of anemia in pregnant population is still high in our country resulting in significant risk to mother and fetus. Community level intervention and implementations regarding prevention of anemia should be established and practically practiced to minimize the adverse fetal outcome among anemic pregnant mothers. There is a need of increasing public awareness regarding hemoglobin status and anemia among women of child bearing age and significance of a regular and planned antenatal check up during pregnancy and education of women regarding maternal complications and adverse maternal and fetal outcome should be started and monitored.

Conclusion

Anemia in pregnant population is alarmingly high. The results of this study show the association of maternal anemia in pregnancy with increased risk of pre-term birth (73/205: 35.60%), low birth weight (58/205:28.29%), still birth (22/205:10.73%) and low APGAR score (106/205:51.70%). It shows that anemia in pregnancy is still a major health problem as well as clearly indicating that maternal anemia is an indicator of adverse pregnancy outcome in our working set ups of Obstetrics & Gynaecology. The improvements achieved in the developed world may largely be due to more effective diagnosis and treatment.

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