

## Frequency of Spontaneous Preterm Birth in Anemic Mothers

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### Abstract

**Objective:** To determine the frequency of spontaneous preterm birth in anemic pregnant mothers.

**Methodology:** This descriptive case series study was conducted at Department of Obstetrics and Gynecology Unit II Foundation University Medical College, Foundation University Islamabad from January – December 2019. All pregnant women who presented to antenatal clinic at >28 and <37 weeks of gestation were selected by consecutive non – probability sampling technique. A thorough history and examination was carried out after fulfilling the inclusion criteria. Blood complete picture was performed on booking visit, at 28th and 34th weeks of gestation. The subjects were followed up till delivery to find out association between anemia and spontaneous preterm birth.

**Results:** A total of 380 subjects were included in the study. Mean age (years) of the subjects was 33.03+/-5.54, whereas mean hemoglobin (gm/dl) at 28th and 34th weeks was 9.51+/-0.99 and 9.76+/-1.03 respectively. Out of 380 subjects, there were 93 (24.5%) anemic mothers having spontaneous preterm birth.

**Conclusion:** Frequency of spontaneous preterm birth in anemic pregnant mothers is substantial. Thus preventive measures must be taken in perinatal period in order to decrease the prevalence of anemia in pregnancy and to reduce the rate of preterm birth and its associated morbidity and mortality.

**Keywords:** Preterm birth, Neonatal birth, Maternal Anemia, Hemoglobin level.

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### Introduction

Preterm birth is the birth of an alive fetus before 37 weeks or 259 days of gestation.<sup>1</sup> About 150, 000 preterm births occur annually worldwide, at a rate of one in every ten babies. The risk is 120 times high in developing countries like Pakistan.<sup>2</sup>

Preterm birth has a major contribution to neonatal morbidity and mortality.<sup>1</sup> The incidence of preterm birth varies between 7-12% in developing countries.<sup>3</sup> About 75% of perinatal deaths and half of childhood neurodevelopmental disabilities, like cognitive and behavioral impairment occurs in infants born preterm.<sup>2</sup> There are multiple causes of preterm birth, and anemia

is one of the leading causes of them.<sup>4</sup>

Over the past decade, there are achievements in mother and child health, but still anemia is a major problem in pregnancy in developing countries. There are multiple causes of anemia, out of which the principal causes of anemia in pregnancy are poor nutrition, infectious disease such as malaria and untreated genetic hemoglobin disorders. Adverse pregnancy outcomes due to maternal anemia are low birth weight, preterm birth, and perinatal, neonatal and maternal mortality. Although different studies show different results for these outcomes in relation to

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maternal anemia, but data available for low and middle income countries is sparse.<sup>4</sup>

The greater the severity of anemia during pregnancy, the greater the risk of preterm birth, low birth weight, and stillbirth.<sup>5</sup>

By WHO definition, anemia is hemoglobin level of <11g/dl.<sup>6,7</sup> Anemia in pregnant women is one of the major public health problem, especially in developing countries. It is estimated that about 41.8% of pregnancies are affected by anemia globally.<sup>2</sup> Two studies conducted in 2018 & 2022 showed that about 5.5%/ 8.3% preterm births respectively occurred in anemic mothers.<sup>7, 8</sup>

There is conflicting literature and limited data available in Pakistan regarding maternal anemia and its effect on perinatal outcomes. The rationale of current study is to determine association between preterm birth and anemic mothers which if found positive, will guide obstetricians to make preventive measures (pre-natal counselling, booking history to rule out risk factors for anemia and their correction and antenatal iron supplements) to decrease the prevalence of anemia in pregnancy and to reduce the rate of preterm birth.

## Methodology

This descriptive case series was conducted at Department of Obstetrics and Gynecology, Unit II, Foundation University Medical College, Foundation University Islamabad. During a one-year period from January – December 2019, all pregnant women at >28 and < 37 weeks of gestation, with anemia were selected by consecutive-non probability sampling. Pregnancy with polyhydramnios, multiple gestation, pregnancy induced hypertension/preeclampsia and gestational diabetes mellitus were excluded from the study. The ethical letter was taken from the IRB, letter no.432/RCFFH/RWP

Informed written consent was taken from the patients, who were given number, rather than using their names. These numbers and data were kept confidential and used for the study purpose.

After through history and examination the subjects who fulfilled the inclusion criteria, their blood complete picture was performed on booking visit, at 28th and 34th weeks of gestation. Hemoglobin was measured by automated method by sysmex XT-18001 and verified by pathology kit. The subjects were followed up till

delivery to find out association between anemia and spontaneous preterm birth.

Data was analyzed by SPSS version 17. Descriptive statistics was used to calculate quantitative and qualitative variables. Mean and standard deviation were calculated for quantitative variable i.e maternal hemoglobin, age, gestational age. For qualitative variables like preterm birth, education, residence, socioeconomic status, and parity frequency, and percentages were calculated. Effect modifiers, age, gestational age, parity, socioeconomic status, residence, education and occupation were controlled by stratification. A post-stratification chi-square test was applied. P<0.05 was taken as significant.

## Results

A total of 380 subjects were included according to the inclusion criteria. Descriptive statistics of age (years), gestational age (weeks) and hemoglobin (gm/dl) were also calculated in terms of mean and standard deviation. The mean age (years), gestational age (weeks) and hemoglobin (gm/dl) of the subjects are shown in table I.

**Table I: Epidemiological Factors (N= 380)**

Parameters	Min	Max	Mean $\pm$ SD
Age (years)	20	42	33.03 $\pm$ 5.54
Gestational age (weeks) at birth	29	41	35 $\pm$ 2.60
Hemoglobin level (gm/dl) at 28 weeks	7	11.50	9.51 $\pm$ 0.99
Hemoglobin level (gm/dl) at 34 weeks	6.70	11.20	9.76 $\pm$ 1.03

**Table II: Frequency of Epidemiological Factors (N=380)**

Parameters	Frequency(n)
<b>Spontaneous preterm birth</b>	
Yes	<b>93 (24.5%)</b>
No	287 (75.5%)
<b>Education</b>	
No education	251 (66.1%)
Matric	85 (22.4%)
Graduation	44 (11.6%)
Master	0 (0.0%)
<b>Residence</b>	
Urban	282 (74.2%)
Rural	98 (25.8%)
<b>Sioeconomic status</b>	
<Rs.20,000 per month	203 (53.4%)
20,000-50,000 per month	125 (32.9%)
>Rs.50,000 per month	52 (13.7%)
<b>Parity</b>	
Primigravida (0)	36 (9.5%)
Multigravida (1-4)	272 (71.5%)
Grandmulti (>5)	72 (18.9%)

Out of 380 subjects, there were 93 (24.5%) anemic mothers having spontaneous preterm birth. Effect

modifiers (age, gestational age, parity, socioeconomic status, residence, education and occupation) were stratified with the frequency and percentages of spontaneous preterm birth in anemic mothers, as shown in table II.

Chi-square test was used to compare these modifiers with frequency of spontaneous preterm birth. The statistically significant modifiers ( $p$ -value  $<0.05$ ) were age, gestational age, socioeconomic status, education and occupation, as shown in table III.

Parameters	Preterm birth		P-value
	Yes	No	
<b>Age group</b>			
20-30 years	47(50.5%)	62(21.6%)	0.000
31-40 years	46(49.5%)	225(78.4%)	
Total	93(100%)	287(100%)	
<b>Gestational age group</b>			
25-30 weeks	8(8.6%)	0(0.0%)	0.000
31-41 weeks	85(91.4%)	287(100%)	
Total	93(100%)	287(100%)	
<b>Parity group</b>			
0-4	69(74.25)	239(83.35)	0.502
5-7	24(25.8%)	48(16.7%)	
Total	93(100%)	287(100%)	

## Discussion

Preterm birth remains one of the primary driver of perinatal morbidity and mortality worldwide.<sup>8,12</sup> The association between maternal anemia and preterm birth remains equivocal with some studies documenting increased risk. The findings from Northern Tanzania studies on the relationship between maternal anemia and preterm birth is also inconsistent. Studies have suggested that the association between maternal anemia and preterm birth may vary based on the timing and severity of anemia during gestation.<sup>7,10</sup> Due to different clinical subtypes of preterm birth, namely, preterm premature rupture of membranes (PROM), spontaneous preterm labor and medically indicated preterm birth, very few studies have attempted to evaluate any association between maternal anemia and preterm birth.<sup>11</sup> If maternal anemia is indeed associated with one preterm birth subtype, and not the others, the association with preterm birth as an entity may be attenuated. Furthermore, an examination of association within particular preterm birth subtypes may reveal interesting clues to etiology and biologic mechanisms.

According to our study the preterm birth rate 24.5% which is in line with preterm birth rate in India according

to study in 2017.<sup>13</sup> But the global rate of preterm birth estimated by WHO is 11%.<sup>11</sup> The reason for highest rate of preterm births in our study is the larger number of subjects were with mean age 33 years, mostly uneducated and belonged to middle socioeconomic group as these factors were found statistically significant ( $p$ -value  $<0.05$ )

Our results showed some of the anemic subjects who delivered at term. This may be the reason that evidence showed no single factor was found to be sufficient for initiation of preterm labor rather combination of factors (environmental and genetic) must be present for preterm labor to occur. This is due to the complexity of etiology for both anemia and preterm birth and it termed as "Etiological Heterogeneity".<sup>9,13</sup>

We found out a significantly high proportion of late preterm births (34-37 weeks) in our study population which was also observed by other researchers but we were unable to identify the exact underlying mechanism for this observation.<sup>13,14</sup> But according to study this may be due to the mild severity of anaemia in late pregnancy.<sup>7</sup>

Our subjects mean hemoglobin (gm/dl) at 28th weeks was 9.51. Similar results were quoted in other studies as well.<sup>7</sup>

Regarding the parity of subjects, we found that the percentage of mothers with parity 3 was 15.67%, which is inconsistent with other studies.<sup>10</sup>

The strengths of our study are: firstly, various studies on preterm labor were conducted in developed countries like UK and USA<sup>15</sup> and their relation with different demographic and epidemiological factors were studied in detail but limited data available in developing countries. Secondly, limited data available on association between preterm birth and certain epidemiological factors that are even not studied in developed countries. These factors were residence (urban and rural), education and occupation. In our study, the relation of preterm birth with these factors were studied in detail and found to be statistically significant.<sup>16</sup>

## Conclusion

No wide difference was observed between the two groups of management of PROM. So, both methods can be successfully employed for the management of term PROM. The choice of method should depend on

the convenience of the obstetrician and the will of the patients. It is also shown that expectant management is more advantageous to nulliparous women in term of more spontaneous deliveries and lesser operative vaginal deliveries. However, expectant management required somewhat more monitoring and patience and practice of no digital examination of the cervix has to be employed at the start of management to reduce maternal and neonatal infectious morbidity.

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