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A STUDY TO DETERMINE THE ASSOCIATION BETWEEN MATERNAL ANEMIA AND PRETERM BIRTH

Dr Saima Shams[1]
[1]Teaching Hospital DHQ Dera Ghazi Khan.

Abstract:
Introduction: Preterm birth remains one of the greatest causes of perinatal mortality and morbidity worldwide. The association between maternal anemia and preterm birth remains equivocal with some, but not other, studies documenting increased risk. The clinical consequences of iron deficiency anemia include preterm delivery, perinatal mortality, and postpartum depression. Objectives: To determine the association between maternal anemia and preterm birth. Study design: This prospective cohort group study was conducted in Department of Obst & Gynae Teching Hospital DHQ, DG Khan during 5 th August 2017 to 4th February 2017. A total of 162 patients (81 anemic and 81 non-anemic), 20 to 40 years of age were included. Patients with multiple pregnancy, h/o diabetes mellitus, pre-eclampsia, cardiac disease, hepatic dysfunction and IUGR were excluded. Patients were divided into exposed and non-exposed groups. Exposed group included the women with anemia while non-exposed group included the nonanemic women. All patients were followed for presence or absence of preterm delivery. Results: The mean age of women in exposed group was 26.93 ± 4.95 years and in non-exposed group was 26.89 ± 4.13 years. The mean gestational age in exposed group was 34.69 ± 0.96 weeks and in non-exposed group was 34.77 ± 0.95 weeks. The mean parity was 2.49 ± 0.77. In my study, preterm birth was seen in 46 (56.79%) women in exposed group compared to 23 (28.40%) in non-exposed group which has shown p-value of 0.0006 and relative risk of 2.00 which is significant and shows a positive association between maternal anemia and preterm birth. Conclusion: This study concluded that there is increased frequency of preterm birth in anemic women as compared to non-anemic women and thus showed a positive association between maternal anemia and preterm birth.
Keywords: Anemia, preterm birth, iron deficiency.

Corresponding author:
Dr Saima Shams,
Teaching Hospital DHQ Dera Ghazi Khan.

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INTRODUCTION:

The main cause of anemia in pregnancy is found out to be iron deficiency, i.e. about 95%. In pregnancy, iron deficiency is exaggerated because of the ability of fetus to extract its requirement in obligatory direction, from a mother whose body iron levels are already depleted. Anemia in pregnancy results in relatively poor maternal and fetal outcome [1]. Maternal effects being preterm labour, pre-eclampsia, sepsis and postpartum haemorrhage and increase need of blood transfusion. Maternal anemia is associated with intrauterine growth retardation and increased risk of preterm births and low birth weight babies [2]. This in turn results in higher perinatal morbidity and mortality, and higher infant mortality rate. Therefore, it is very important to manage gestational anemia before it may lead to far reaching complications. Preterm birth remains one of the greatest causes of perinatal mortality and morbidity worldwide [3]. The association between maternal anemia and preterm birth remains equivocal with some, but not other, studies documenting increased risk. The clinical consequences of iron deficiency anemia include preterm delivery, perinatal mortality, and postpartum depression. Fetal and neonatal consequences include low birth weight and poor mental and psychomotor performance [4].

Since maternal anemia is a common event in this area and in a national nutrition survey report 2011, prevalence of maternal anemia was found to be 49.3% but no local study available to evaluate its role in preterm labor, so the rationale of this study was to determine the association between maternal anemia and preterm birth in local population [5]. The available stats are not applicable to our 5 population because majority of our population belongs to rural areas and low socioeconomic status, so there is a chance of variable stats in our population, so the present study is designed to confirm the same in our local population [6,7]. Then based on these results, public awareness can be arranged regarding this major public health issue among women of reproductive age group as well as treating clinicians for early screening and management of maternal anemia in order to reduce the preterm birth [8,9].

Aims and objectives
The objective of the study was:
"To determine the association between maternal anemia and preterm birth."

MATERIAL AND METHODS:
This prospective cohort group study was conducted in Department of Obst & Gynae Teching Hospital DHQ, DG Khan during 5th August 2017 to 4th February 2017. Non-probability, consecutive sampling technique was used for data collection.

Inclusion Criteria:
1. All women with maternal anemia as per-operational definition.
2. All non-anemic women as per-operational definition.
3. Gestational age of >32 weeks (assessed on LMP).

Exclusion Criteria:
1. Multiple pregnancy (assessed on ultrasonography).
2. History of diabetes mellitus (FBS >110 mg/dl on 2 consecutive occasions), preeclampsia (B.P >130/90 mmHg and proteinuria on dipstick), cardiac disease and hepatic dysfunction (s/bilirubin >1 mg/dl).

Data collection procedure
After approval from ethical committee of DHQ hospital Dera Ghazi Khan, informed consent was taken from patients before including patient's data in research and they were ensured about their confidentiality. Patient's telephonic contacts and addresses were taken. Patients were divided into exposed and non-exposed groups. Exposed group included the women with anemia while non-exposed group included the non-anemic women. All patients were followed for presence or absence of preterm delivery (as per-operational definition. This all data was recorded on a specially designed proforma.

Statistical analysis
Statistical analysis was performed using SPSS version 22.0. Results were presented as mean and standard deviation for quantitative variables i.e. age, gestational age, parity, hb levels, serum ferritin levels and body mass index (BMI). Frequency and percentage were calculated for qualitative variable like previous h/o preterm birth (yes/no), place of living (rural/urban), education status (illiterate/primary/middle/matric/graduate) and preterm birth (yes/no). Relative risk was calculated with 95% confidence interval keeping P-value ≤ 0.05 was considered as significant.

RESULTS:
The data was collected from100 patients of both groups. The mean age of women in exposed group was 26.93 ± 4.95 years and in non-exposed group was 26.89 ± 4.13 years. The mean gestational age in exposed group was 34.69 ± 0.96 weeks and in non-exposed group was 34.77 ± 0.95 weeks. The mean parity was 2.49 ± 0.77. In my study, preterm birth was seen in 46 (56.79%) women in exposed group compared to 23 (28.40%) in non-exposed group which has shown p-value of 0.0006 and relative risk of 2.00 which is significant and shows a positive association between maternal anemia and preterm birth. After adjusting for the socio-demographic and pregnancy-related characteristics, we found that

compared with women with mild anaemia/normal Hb level, women with severe anaemia had a more than nine fold higher odds of PPH (adjusted OR (aOR) 9.45; 95% CI 2.62 to 34.05), a six fold higher odds of giving birth to a low birth weight baby (aOR 6.19; 95% CI 1.44 to 26.71), and an almost nine fold higher odds of having a small-for-gestational age

baby. Women with moderate anaemia also had higher odds of PPH, low birth weight and small-for-gestational age babies compared with women with mild anaemia/normal Hb level, but the association was statistically significant only for the low birth weight outcome.

Table 01: Association between maternal anaemia and maternal and infant outcomes in both groups

	Outcome present, n (%)	Outcome absent, n (%)	Unadjusted OR (95% Robust CI)	Adjusted OR (95% Robust CI)
Postpartum haemorrhage				
Anaemia				
Normal/mild (≥10 g/dL)	15 (2.3)	41 (97.7)	1 (ref)	1 (ref)
Moderate (7–9.9 g/dL)	13 (3.9)	16 (96.1)	1.76 (0.79 to 3.90)	1.50 (0.80 to 2.80)
Severe (<7 g/dL)	5 (23.8)	16 (76.2)	13.35 (4.88 to 36.54)	9.45 (2.62 to 34.05)
Anaemia and/or induction of labour				
None	12 (2.1)	55 (97.9)	1 (ref)	1 (ref)
Either	14 (3.9)	35 (96.1)	1.85 (0.91 to 3.75)	1.76 (0.96 to 3.22)
Both	5 (20.0)	20 (80.0)	11.56 (2.38 to 56.13)	17.39 (3.73 to 80.97)
Missing	2 (4.0)	48 (96.0)	1.93 (0.95 to 3.89)	2.14 (1.15 to 3.99)
Anaemia and/or infection				
None	14 (2.3)	8 (97.7)	1 (ref)	1 (ref)
Either	12 (3.9)	26 (96.1)	1.70 (1.06 to 2.75)	1.39 (0.89 to 2.15)
Both	4 (25.0)	12 (75.0)	14.00 (1.66 to 118.07)	18.80 (3.57 to 98.93)
Missing	3 (3.8)	77 (96.2)	1.64 (0.31 to 8.56)	2.64 (0.21 to 33.45)
Low birth weight				
Anaemia				
Normal/mild (≥10 g/dL)	60 (25.2)	47 (74.8)	1 (ref)	1 (ref)
Moderate (7–9.9 g/dL)	19 (29.2)	22 (70.8)	1.22 (0.94 to 1.58)	1.26 (1.04 to 1.53)
Severe (<7 g/dL)	12 (60.0)	8 (40.0)	4.44 (1.75 to 11.28)	6.19 (1.44 to 26.71)
Anaemia and/or infection				
None	42 (24.4)	44 (75.6)	1 (ref)	1 (ref)
Either	36 (29.3)	20 (70.7)	1.28 (0.99 to 1.65)	1.27 (0.99 to 1.65)
Both	3 (21.4)	11 (78.6)	0.85 (0.37 to 1.95)	1.21 (0.40 to 3.59)
Missing	32 (42.1)	44 (57.9)	2.25 (1.18 to 4.29)	1.32 (0.70 to 2.49)
Small-for-gestational age (singleton liveborn, n=881)				
Anaemia				
Normal/mild (≥10 g/dL)	25 (43.7)	23 (56.3)	1 (ref)	1 (ref)
Moderate (7–9.9 g/dL)	43 (49.5)	46 (50.5)	1.26 (0.82 to 1.94)	1.25 (0.91 to 1.73)
Severe (<7 g/dL)	15 (83.3)	3 (16.7)	6.43 (0.87 to 47.39)	8.72 (1.66 to 45.67)
Anaemia and/or infection				
None	28 (43.1)	30 (56.9)	1 (ref)	1 (ref)
Either	34 (49.8)	35 (50.2)	1.31 (0.83 to 2.07)	1.20 (0.80 to 1.80)
Both	6 (42.9)	8 (57.1)	0.99 (0.50 to 1.98)	1.40 (0.67 to 2.93)
Missing	41 (59.4)	28 (40.6)	1.93 (1.26 to 2.97)	1.35 (0.87 to 2.11)
Perinatal deaths				
Anaemia				
Normal/mild (≥10 g/dL)	18 (2.8)	628 (97.2)	1 (ref)	1 (ref)
Moderate (7–9.9 g/dL)	10 (3.1)	310 (96.9)	1.13 (0.65 to 1.96)	1.18 (0.64 to 2.19)
Severe (<7 g/dL)	4 (19.1)	17 (80.9)	8.21 (3.20 to 21.09)	16.42 (4.38 to 61.55)

DISCUSSION:

Preterm birth remains one of the greatest causes of perinatal mortality and morbidity worldwide. The association between maternal anaemia and preterm birth remains equivocal with some, but not other, studies documenting increased risk [10]. The findings from Chinese studies on the relationship between anaemia and preterm birth are also inconsistent. Studies have suggested that the association between anaemia and preterm birth may vary based on the timing of anaemia during gestation [11].

Despite the considerable aetiological heterogeneity in preterm birth clinical subtypes, namely, preterm premature rupture of membranes (PROM), spontaneous preterm labour and medically indicted preterm birth, very few studies have attempted to evaluate if associations between anaemia and preterm birth are largely driven by associations with one particular subtype [12-15]. If maternal anaemia is indeed associated with one preterm birth subtype, and not others, the association with preterm birth as an entity may be attenuated [16].

I have conducted this study to determine the association between maternal anemia and preterm birth. Age range in my study was from 20 to 40 years with mean age of 26.90 ± 4.65 years. The mean age of women in exposed group was 26.93 ± 4.95 years and in non-exposed group was 26.89 ± 4.13 years. Majority of the patients 125 70 (77.16%) were between 20 to 30 years of age [17]. The mean gestational age in exposed group was 34.69 ± 0.96 weeks and in non-exposed group was 34.77 ± 0.95 weeks. In my study, preterm birth was seen in 46 (56.79%) women in exposed group compared to 23 (28.40%) in non-exposed group which has shown p-value of 0.0006 and relative risk of 2.00 which is significant and shows a positive association between maternal anemia and preterm birth [18]. In a study, preterm delivery in non-anemia group was 20% while it was 60.0% in anemia group [19,20].

CONCLUSION:

This study concluded that there is increased frequency of preterm birth in anemic women as compared to non-anemic women and thus showed a positive association between maternal anemia and preterm birth. So, we recommend that public awareness programs should be arranged regarding this major public health issue among women of reproductive age group as well as treating clinicians for early screening and management of maternal anemia in order to reduce the preterm birth.

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