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Maternal Morbidity Due to Iron Deficiency Anemia in A Tertiary Care Hospital

Uroosa Din Muhammad, Shakila Parveen, Shaheen Aslam Baloch, Tehreem Yazdani, Mehwish Munir, Sobia Hanif

Department of Gynae & Obs, Pak Emirates Military Hospital Rawalpindi/ National University of Medical Sciences (NUMS) Pakistan, Department of Gynae & Obs, Combined Military Hospital Mangla/ National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine the presence and severity of iron deficiency anemia among the booked cases and find association of maternal morbidity parameters with presence and severity of iron deficiency anemia

Study Design: Comparative cross sectional study.

Place and Duration of Study: Gynecology and Obstetrics department, Pak Emirates Military Hospital, Rawalpindi Pakistan from Jun 2021 to May 2022

Subjects and Methods: a total of 3680 booked cases were included in the study and underwent basic laboratory examination including blood complete picture and ferritin levels at time of initial assessment. Presence and severity of iron deficiency anemia was assessed by consultant obstetricians on the basis of WHO criteria. Patients were followed up till delivery and early post-natal period by research team to look for maternal morbidity parameters.

Results: Out of 3680 booked pregnant women included in the study, 1680(45.6%) were primiparous while 2000 (54.4%) were multiparous. Mean age of the women in our study was 32.65±6.758 years. 1297(35.2%) had no anaemia, 1162(31.5%) had mild, 1108(30.1%) had moderate while 113(3.1%) had severe anaemia. Preterm birth, preeclampsia, sepsis and post-partum haemorrhage had statistically Signiant association with presence and severity of anaemia in our target population (*p*-value<0.001).

Conclusion: Iron deficiency anemia was not an uncommon finding among booked cases managed during ante-natal, natal and early post-natal period in our hospital. pre-term birth, pre-eclampsia, post-partum hemorrhage sepsis and risk of post-operative delivery were found significantly more in cases who had anemia, especially moderate to severe anemia.

Keywords: Iron deficiency anemia; Maternal morbidity: Severity of anemia

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INTRODUCTION

Maternal mortality and morbidity has been an area of interest for clinicians and epidemiologist across the globe especially for the women of developing countries.[1] Statistics still are really alarming in our part of the world and every year a huge number of women experience serious problems during the course of pregnancy, delivery and early post-partum period.[2] Main aim of the treating teams is to pick the high risk individuals early and prevent the complications during this phase of lives of women.[3]

Iron deficiency anemia is a common problem especially among the females of developing countries.[4] It has been associated with multiple other health related conditions as a cause or consequence but situation become worse when women is pregnant and need better hematological profile for her wellbeing as well as wellbeing of fetus.[5] Obstretric team needs to be well aware of this hematological parameter of pregnant woman they have managing especially booked cases in order to timely manage and prevent complications.[6]

Iron deficiency anemia has been associated with maternal morbidity and mortality in various studies done in recent past. Dorsamy *et al.*, devised a protocol in this regard for developing region like South Africa where nutritional deficiencies and other factors not only cause iron deficiency anemia in women of child bearing age but also directly contribute to maternal morbidity.[7] Guignard et al. in 2021 published a population based study in 2021 regarding relationship of anemia with severe acute maternal morbidity. They revealed that severe postpartum haemorrhage was found more in women who had low haemoglobin levels during the course of pregnancy. Other morbidity parameters during pregnancy like hypertensive illness was also found more in patients who had anaemia in gestational period.[8] An interesting study was published in 2019 regarding data from rural population of India and Pakistan regarding maternal anemia and maternal, fetal, and neonatal outcomes.[9] It was concluded that mild and

Correspondence: Dr Uroosa Din Muhammad, Department of Gynae & Obs, Pak Emirates Military Hospital Rawalpindi Pakistan

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moderate anemia was not associated with poor maternal and fetal outcomes but severe anemia was a strong predictor of poor maternal and fetal outcomes in their study participants from both the countries.

Developing nations have their own mechanics in health care system. Limited resources compromise a lot of vital steps which could ensure wellbeing of patients and general population. Maternal morbidity and mortality has always been an issue of developing world. Drop in hematological parameters has been a consistent finding among pregnant women in countries like ours. A recent study published data from all South Asian states including Pakistan regarding association of anemia with stillbirth, preterm birth, lower mean birthweight, and increased risk of low birthweight.[10] Limited local data has been available regarding relationship of various maternal morbidity parameters with anaemia. We therefore planned this study with the rationale to determine the presence and severity of iron deficiency anemia among the booked cases and find association of maternal morbidity parameters with presence and severity of iron deficiency anemia.

METHODOLOGY

This comparative cross sectional study was conducted at the Obstetrics department of Pak Emirates Military Hospital Rawalpindi between June 2021 to May 2022. Non-probability consecutive sampling technique was used to recruit the booked pregnant women for this study. Sample size was calculated by using population prevalence proportion of anemia in pregnant women as 57.4%.[11]

Inclusion Criteria: All the pregnant women between the age of 19 and 45 years of any parity who were managed as booked cases in our department were included in the analysis.

Exclusion Criteria: Pregnant women who had B-12 or folate deficiency, had recent surgery, had NSAIDs abuse or any autoimmune were excluded. Women with history of unexplained abortions or congenitally malformed babies in the past were also excluded. Women with anemias other than iron deficiency anemia were not included in the analysis. Women with gestational diabetes, hypertension or any other disease which warranted long term medications were excluded as well.

Ethical approval was granted by the committee of hospital before the start of this study (letter no: A/28/179(1)). All women who were booked cases were approached to participate in the study after application of inclusion/exclusion criteria. They were given full description of the study before they were given a form to sign the consent. Women underwent all baseline investigations at time of initial assessment including blood complete picture and ferritin levels. They were followed up till early post-partum period for any parameters of maternal morbidity and relevant documentation was done on a performa researchers designed for this study.

According to World Health Organization, anemia during pregnancy was identified by hemoglobin levels less than 11.0g/dL and was classed as: mild anemia (Hb levels 9 to 10.9g/dL), moderate anemia (Hb levels 7 to 8.9g/dL), and severe anemia (Hb levels less than 7g/dL).[12]

Maternal morbidity factors were studied during antepartum, intrapartum and post-partum period. Parameters in the study included pre-eclampsia, preterm birth, sepsis, intrapartum or post-partum morbidity, operative delivery, post-partum hemorrhage and post-partum depression.[13] A consultant psychiatrist diagnosed post-partum depression on the basis of ICD-10 criteria.[14]

All statistical analysis was performed using Statistics Package for Social Sciences version 23.0 (SPSS-23.0). Percentage and frequency were calculated for qualitative variables like presence or absence of iron deficiency anemia. Pearson chi-square was applied to look for association of various maternal morbidity parameters with presence and severity of iron deficiency anemia. The *p*-values were less than or equal to 0.05 were considered significant by the researchers for both chi-square analysis.

RESULTS

A total of 3680 booked pregnant were women included in the study. Out of these, 1680(45.6%) were primiparous while 2000(54.4%) were multiparous. Table-I showed the characteristics of women recruited in the analysis. Mean age of the women in our study was 32.65±6.758 years. 1297(35.2%) had no anaemia, 1162(31.5%) had mild, 1108(30.1%) had moderate while 113(3.1%) had severe anaemia. Regarding Antenatal complications, 600(16.3%) had preeclampsia, 911(24.7%) had pre-term birth while 174(4.7%) had sepsis. When post-partum complications were recorded, 338(9.1%) had operative delivery, 344 (9.3%) had post-partum haemorrhage while 90(2.4%) had postpartum depression.

Table-I: Characteristics of The Women Included In The Analysis

Study parameters	n(%)
Age (years)	
Mean + SD	32.65 ±6.758 years
Range (min-max)	19 years - 44 years
Parity	
Primiparous	1680(45.6%)
Multiparous	2000(54.4%)
Anemia	
No anemia	1297(35.2%)
Mild	1162(31.5%)
Moderate	1108(30.1%)
Severe	113(3.1%)
Antepartum morbidity	
Pre-Eclampsia	600(16.3%)
Preterm birth	911(24.7%)
Sepsis	174(4.7%)
Intrapartum or post-partum morbidity Operative delivery	
Post-partum hemorrhage	338(9.1%)
Post-partum depression	344(9.3%) 90(2.4%)

Table-II summarized the results of statistical analysis. It was revealed that preterm birth (*p*-value<0.001), preeclampsia (*p*-value<0.001), sepsis and post-partum haemorrhage (*p*-value<0.001) had statistically Signiant association with presence and severity of anaemia in our target population while operative delivery (*p*-value-0.135) and postpartum depression (*p*-value-0.219) did not show any such relationship with haemoglobin indices in our study participants.

DISCUSSION

Developing countries still have high indices of maternal mortality and morbidity despite increased availability of health care resources. All efforts have been put in by the health teams for prevention of morbidity in this vulnerable group of individuals. There are multiple factors which make women at high risk for various morbidity parameters during various phases of pregnancy, labor and postpartum period. Early identification and management of these factors may save mother and baby from grave and irreversible consequences. Nutritional deficiencies and other parameters prone women towards different types of anemias including iron deficiency anemia. How this important hematological deficiency affect maternal morbidity is a question posed by clinical teams? We therefore planned this study with an aim to determine the presence and severity of iron deficiency anemia among the booked cases and find association of maternal morbidity parameters with presence and severity of iron deficiency anemia.

Patel *et al.,* published a study based on data of our neighboring country regarding impact of anemia and weight of mother on pregnancy outcomes. They came up with the findings that maternal anemia during pregnancy is associated with pre-term birth, still birth and low birth weight of babies.15We did not study association of fetal parameters but pre-term birth, PPH and sepsis were associated with presence and severity of anemia in our study participants.

Table-II: Association of morbidity parameters with presence and severity of anemia

Morbidity parameters	No Iron deficiency anemia	Mild Iron deficiency anemia	Moderate Iron deficiency anemia	Severe Iron deficiency anemia	*p*-value
Pre term birth					
No	946(72.9%)	967(83.2%)	813(73.3%)	43(38.1%)	<0.001
Yes	351(27.1%)	195(16.8%)	295(26.7%)	70(61.9%)	
Pre-eclampsia					
No	1184(91.2%)	998(85.8%)	828(74.7%)	84(74.3%)	<0.001
Yes	113(8.8%)	164(14.2%)	280(25.3%)	29(25.7%)	
Post-partum hemorrhage					
No	1242(95.7%)	1052 (90.5%)	958(86.4%)	70(61.9%)	<0.001
Yes	55(4.3%)	110(9.5%)	150(13.6%)	43(38.1%)	
Operative delivery					
No	1172(90.3%)	1064(91.5%)	998(90.1%)	108(95.5%)	0.135
Yes	125(9.7%)	98(8.5%)	110(9.9%)	05(4.5%)	
Sepsis					
No	1275(98.3%)	1120(96.3%)	1038 (93.6%)	73(64.6%)	<0.001
Yes	22(1.7%)	42(3.7%)	70(6.4%)	40(35.4%)	
Post-partum depression					
No	1262(97.3%)	1132(97.4%)	1088(98.1%)	108(95.5%)	0.259
Yes	35(2.7%)	30(2.6%)	20(1.9%)	05(4.5%)	

United states is a developed country with best facilities in terms of maternal and child health but still a recent study revealed that postpartum haemorrhage, hypertensive disorders, operative delivery, and sepsis had strong association with maternal anemia.[16] Our results showed that iron deficiency anaemia was not an uncommon finding among booked cases managed during ante-natal, natal and early post-natal period in our hospital. pre-term birth, pre-eclampsia, post-partum haemorrhage sepsis and risk of post-operative delivery were found significantly more in cases who had anaemia, especially moderate to severe anaemia.

In 2022 a systematic review and meta-analysis was published which covered all the relevant statistics related to anaemia in pregnant women including outcomes of pregnancy. It was concluded that low birth weight, preterm birth and hypertension were the consequences related to anemia.[17] Our study results supported the findings as we also concluded that preterm birth, sepsis, preeclampsia and PPH were strongly associated with iron deficiency anaemia and especially severe form of anaemia.

Rojas-Suarez *et al.*, in 2020 studied impact of anaemia in Obstetric Shock Index in pregnant women. They came up with the findings that mild to moderate anaemia did not affect post-partum haemorrhage and Obstetric Shock Index. It was only severe anaemia which predicted PPH.[18] Results of our study showed similar patterns regarding relationship of anaemia and post-partum haemorrhage in pregnant women.

LIMITATIONS OF STUDY

It was a single center study involved mostly wives of military soldiers which have better access to overall health care facilities so their data may be under representation of problem studied in this analysis. Though our criteria were quite strict which made our sample size restricted but still a lot of confounding factors can be involved in maternal morbidity therefore it cannot be concluded that morbidity was due to presence or severity of anemia.

CONCLUSION

Iron deficiency anemia was not an uncommon finding among booked cases managed during ante-natal, natal and early post-natal period in our hospital. pre-term birth, pre-eclampsia, post-partum hemorrhage sepsis and risk of post-operative delivery were found significantly more in cases who had anemia, especially moderate to severe anemia.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

UDM& SP: Data acquisition, data analysis, critical review, approval of the final version to be published.

SAB & TY: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MM & SH: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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