Original Article

Anaemia in Booked and Unbooked Pregnant Women at Term in a Lower Middle Income Country: A Hospital Based Study

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Abstract

Background: Anaemia is a severe public health problem affecting both developed and developing countries. It is most commonly associated with poverty, poor nutritional status and lack of family planning and antenatal care services especially in the third world countries.

Objectives: To investigate the burden of anaemia in pregnant women at term presenting to Central Park Teaching Hospital and to evaluate the association of severity of anaemia with booking status and parity.

Methods: This is a cross sectional study in which purposive convenience sampling technique was used for data collection of the anaemic women at term (gestation age ≥ 37 weeks). Hemoglobin level, degree of anaemia, booking status and parity status of the study population were obtained from patient records. SPSS version 27 was used. Pearson's Chi-square test was used to check the association between variables. The p-value of ≤ 0.05 being considered statistically significant.

Results: The frequency of anaemia at term was found to be 49.6% in our study. Anaemia was more common among multigravida (59.4%) and in booked patients (65.3%) with statistically significant differences. More patients with severe anaemia (71.4%) concluded their pregnancy on C-section as compared to patients with mild (54.8%) or moderate (71.0%) anaemia however, this difference was statistically insignificant.

Conclusion: Anemia remains a significant health problem among pregnant women at term in this lower middle–income setting. Higher frequency was observed among multigravida women and those who were booked, indicating that routine antenatal care alone may not be sufficient to prevent anemia.

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Introduction

Anaemia in pregnancy is a severe public healt problem affecting both developed and developing countries with major consequences for human health as well as socioeconomic development.[1] It is most commonly associated with poverty, poor nutritional

status and lack of family planning especially in third-world nations.[2] According to World Health Organization (WHO), over 2000 million people are anaemic, with pregnant women most affected.[1,3] Serious consequences for both the mother and the foetus are linked to severe anaemia during pregnancy. Additionally, it is among the avoidable indirect causes of maternal death.[4] Iron deficiency is frequently the cause of anaemia in pregnancy, which the WHO defines as a haemoglobin level of less than 11 g/dl. The WHO recommends the definition of severe, moderate, and mild anaemia for pregnant women as hemoglobin concentrations of less than 7.0 g/dl, 7.0 to 9.9 g/dl, and 10.0 to 10.9 g/dl (to convert g/L to g/dL, divide by 10.0), respectively.[5]

In 2016, anaemia during pregnancy affected 40.05% of pregnant women globally, with Southeast Asia having the greatest prevalence (48.15%).[6] Anaemia during pregnancy is estimated to affect 41.8% of pregnant women worldwide. Iron deficiency anaemia (IDA) can significantly affect the health of both the mother and the foetus if it is not identified and treated.[7]

Increased physiological and foetal needs, insufficient nutrition, poor absorption from endemic illnesses like malaria and hookworm infestation, and blood loss from numerous pregnancy losses or during and after labour are some of the factors that contribute to anaemia in obstetrics. The developing foetus receives all of its iron needs from the maternal iron reserves or from the iron that is absorbed from her food. Every obstetric procedure results in a significant iron deficiency, which, if left unchecked, leads to anaemia in women who are multigravida and have closely spaced pregnancies. Primiparous females and higher birth order pregnancies differ mostly in this regard.[8]

In Pakistan, the overall pooled prevalence of anaemia among pregnant women was reported to be 70.4% according to the forest plot of sixteen researches in a meta-analysis. According to a subgroup study of pregnant women by area and trimester, Punjab had the greatest prevalence of anaemia (77.4%) with 78% of women in the second trimester of pregnancy. [9]

Present study aims to gather data on anaemia at term of pregnancy specifically targeting the population around Central Park Teaching Hospital which is situated in the suburbs of Lahore.

This study will help to formulate policies and targeted interventions to improve antenatal care and reduce the burden of anaemia in our population.

Our objective of this study was to investigate the burden of anaemia in pregnant women at term in our hospital and to evaluate the association of severity of anaemia with booking status and parity.

Methods

This cross sectional study was conducted at Pathology Department of Central Park Medical College, Lahore spanning six months, from January 1 to June 30, 2023. Institution review board (IRB) approval was obtained before the start of this study vide letter number CPMC/IRB-No/1374, dated October 3, 2022.

The operational definitions (definitions of variables) are as follows:

Term- A gestation age of 37 weeks or more, as determined by the date of the last regular menstrual cycle, was considered term.[10]

Booked patient- A patient who had attended at least three antenatal clinic visits and received at least one dose of tetanus immunization.[11]

Anaemia- WHO defines anaemia in third trimester of pregnancy as Hb < 11.0 g/dl.

Anaemia was classified as follows:

Severe = < 7.0 g/dl

Moderate = 7.1 – 9.9 g/dl

Mild = 10 – 10.9 g/dl

(As per WHO, 2011 criteria)[5,12]

Primigravida- A woman pregnant for the first time

Multigravida- A woman who has become pregnant two or more times.

Conveniently, data from women admitted to the prenatal ward who were not in active labour and who were at term (gestation age > 37 weeks based on the date of the last regular menstrual cycle) were chosen for the study. A purposive convenience sampling technique was used for data collection.

The study did not include data from patients with emergency obstetric events, hemoglobinopathies or chronic illnesses like diabetes mellitus, tuberculosis or autoimmune disorders.

Hemoglobin (Hb) level and other relevant data of the pregnant patients at term was obtained from Central Park Teaching Hospital records. Hemoglobin was determined using the Mindray BC-6200, a fully automated 5-part differential hematology analyzer. Booking status (booked or un-booked patients), parity status (primigravida or multi-gravida), degree of anaemia (mild, moderate or severe) and the mode of delivery (Vaginal delivery or C-section) of all the anaemic patients were

recorded in excel sheet.

Data were evaluated using SPSS version 27. Numerical Data was presented in numbers and percentages through tables. The association between the variables was examined using the Pearson's Chi-square test. The p-value of ≤0.05 being considered statistically significant.

Results

Over the period of six months, 407 pregnant women at term presented in the obstetric department of Central Park Teaching Hospital. Out of 407 pregnant women at term, 202 were diagnosed with anaemia. In this study, the frequency of anaemia at term was found to be 49.6%. Table 1 shows the distribution and severity of anaemia in the study population.

Table 1: *Frequency and severity of anaemia*

				Severity of anaemia		
	Non-Anaemic	Anaemic	Total (n)	Mild	Moderate	Severe
Frequency	205	202	407	157	38	7
Percentage (%)	50.4%	49.6%	100.0 %	38.6%	9.3%	1.7%

The parity status of the patients was compared with the severity of anaemia (mild, moderate or severe) in Table 2. The findings indicate that out of the total anaemic cases at term, anaemia was more common in multigravida patients as compared to primigravida patients and this difference is statistically significant.

Table 2: *Case distribution according to parity status and severity of Anaemia (n=202)*

		Severity of anaemia			Total	P-Value
		Mild	Moderate	Severe		
Parity	Primigravida	72 (35.6%)	7 (3.5%)	3 (1.5%)	82 (40.6%)	
	Multigravida	85 (42.1%)	31 (15.3%)	4 (2.0%)	120 (59.4%)	0.023*
Total		157	38	7	202	

In Table 3, the patients' booking status and their anaemia severity (mild, moderate, or severe) were compared. According to the results, anaemia was more prevalent in booked patients than in unbooked patients out of all the anaemic cases at term, and this difference is statistically significant (P-value = < 0.001).

Table 4 shows that out of 202 anaemic patients, 118 (58.4%) underwent Cesarean section while 84 (41.6%) delivered through spontaneous vaginal delivery (SVD). However, the difference is statistically insignificant (p-value 0.064).

Table 3: *Case distribution according to booking status and severity of Anaemia*

		Severity of anaemia n(%)			Total n(%)	P-Value
		Mild	Moderate	Severe		
Booking Status	Booked	121 (59.9%)	7 (3.5%)	4 (1.98%)	132 (65.3%)	< 0.001*
	Unbooked	36 (17.8%)	31 (15.3%)	3 (1.5%)	70 (34.7%)	
Total		157	38	7	202	

**P- value is less than 0.05 i.e. significant.*

Table 4: *Case distribution according to mode of delivery and severity of Anaemia (n=202)*

		Mode of Delivery		Total	P-Value
		C- sec	SVD		
Severity of anaemia	Mild	86 (54.8%)	71 (45.2%)	157	
	Moderate	27 (71.0%)	11 (28.9%)	38	0.064
	Severe	5 (71.4%)	2 (28.6%)	7	

Discussion

This study was conducted to determine the frequency of anaemia in pregnant women at term presenting at the obstetrics department of Central Park Teaching Hospital, Lahore during the study period. Out of 407 pregnant women at term, 202 were diagnosed with anaemia. So, the frequency of anaemia in pregnant women was found to be 49.6%. This is consistent with a previous study from Pakistan where the frequency of anaemia in pregnancy was reported to be 51.5%.[13] Another study from Lahore, however, reported higher (57.7%) prevalence of anaemia in the participants.[14] Anaemia during pregnancy is a significant health problem and its prevalence varies from 18% in developed countries to as high as 78% in developing nations.[15] Compared to the current study, the prevalence of anaemia throughout pregnancy in India has been reported to range from 65 to 78%.[16,17] Similarly, high rates of anaemia in pregnant women are reported by several studies from Africa.[10,15] In developing nations, the increased prevalence of anaemia in pregnant women is mostly caused by food shortages superimposed on hemoglobinopathies, parasitic infections and deficiencies of iron, vitamin B12 and folic acid while in developed countries, hemoglobinopathies are mainly responsible for anaemia in pregnancy.[15]

In our study, 157 out of 202 (77.7%) were having mild

anaemia, 38 (18.8%) had moderate anaemia while 7 (3.46%) had severe anaemia. This is in accordance with another study from Lahore, Pakistan conducted by Ullah A et al. in which mild anaemia was reported to be more common than moderate or severe anaemia.[14] Our results are, however, in contrast to the studies conducted in neighboring countries of the region showing that moderate anaemia was more frequent than mild and severe anaemia.[17,18]

The high prevalence of mild anaemia in our patients could be due to the fact that some women are anaemic way before they are pregnant. This is evidenced by the National Nutritional Survey (2018) in which it was reported that anaemia among adolescent girls is 56.6% and anaemia among women of reproductive age (15-49 years) is 41.7%.[19]

Another possible explanation for predominance of mild anaemic patients is that most of these patients were booked (as shown in Table 3) and were given hematinic therapy during their antenatal visits which resulted in improvement of their hemoglobin levels, though not ameliorating anaemia completely.

The statistics of this study manifest that anaemia is more frequent in multigravida at term (59.4%) with 42.1% being mild anaemic followed by moderate and severe anaemia respectively (as shown in table 2). This finding is in line with other national[13,20,21] and international studies conducted in different regions of the world.[16,18]

One of the main risk factors for anaemia is multiparty itself. As previously mentioned, the National Nutritional Survey (2018) found that anaemia is significantly more common in teenage girls and women of childbearing age.[19] Multiparity exacerbates the condition by adding to the demands of pregnancy on women who are already anaemic. Women with higher birth orders are more likely to experience inadequate iron reserve replenishment following a pregnancy event, in addition to the commonly occurring causes of anaemia in pregnancy. Every obstetric procedure results in a significant iron deficiency, which, if left unchecked, causes anaemia in women with repeated pregnancies.[8]

Diagnosis of anaemia, if established early in pregnancy provides enough time to take corrective measures and prevent feto-maternal complications. In this regard, booking of the pregnant woman at obstetric facility (i.e.to attend at least 3 antenatal visits) is essential to take care of fetal as well as mother's health throughout the process. The treating obstetrician faces a difficult situation when anaemic women appear during labour because even a small amount of blood loss during delivery could be fatal.[16]

Current study showed a statistically significant difference among frequency of booked (65.3%) and unbooked (34.7%) anaemic patients. These figures visibly look alarming but considering the fact that Central Park Teaching Hospital is located in the outskirts of Lahore with the catchment area consisting mostly of working class social stratum. A number of studies have shown that anaemia is related to poor socioeconomic background, illiteracy, and multiparity[22] and this could be a reason for high frequency of mild anaemia in our booked patients.

A study conducted by Sudha and Madenor in 2023 in a neighboring country observed a 58% frequency in patients who were booked, which may be brought about by inconsistent iron medication and infrequent haemoglobin testing.[16]

Another factor of importance discussed in Duncan BS and McDade's research is that girls are 2.4 times more likely than boys to suffer from iron insufficiency even in homes with adequate incomes in developing countries. This disparity in risk is similar to culturally defined gender-based child-feeding prohibitions: it is thought that boys benefit from "hard foods" like meat and beans while girls benefit from "soft foods" like rice, maize porridge, and tea. As a result, boys are being served iron-rich meals more often in homes that can afford to buy them.[23]

In our study, 58.4% and 41.6% of anaemic women delivered by C-section and vaginally respectively. This is in line with the findings of Savaliya K. et al. who pointed out that 47.14% of anaemic women gave birth vaginally and 50% had a caesarean section.[8]

According to a meta-analysis, pregnant women who were anaemic had a 1.63-fold increased chance of having a C-section compared to those who were not. Given that maternal anaemia has been linked to prenatal discomfort, it might be one of the causes of increased frequency of C-section in anaemic women. Additionally, anaemia might hinder the uterus's ability to receive oxygen, which can result in uterine inertia during birth. The higher risk of C-section among anaemic pregnant women may possibly be explained by poor placentation and placental insufficiency, characteristics of the placenta in these patients.[24]

Conclusion

Anemia remains a significant health problem among pregnant women at term in this lower middle–income setting, with nearly half of the study population affected.

Higher frequency was observed among multigravida women and those who were booked, indicating that routine antenatal care alone may not be sufficient to prevent anemia. Strengthening nutritional interventions, early detection and effective management strategies during pregnancy are essential to reduce the burden and complications of maternal anemia.

Further recommendation:

Further research is suggested to investigate the barriers to the use of antenatal care services, causes of anaemia in pregnant women and the potential causes of low compliance to hematinics.

Limitations of the study:

This is a single center study which did not address the factors that influence the development or progression of anaemia till term of pregnancy. To ensure the safe feto-maternal outcomes of pregnancy, knowledge and rectification of risk factors of anaemia is of utmost importance.

Ethical Approval: The Institutional Ethical & Review Board, Central Park Medical College, Lahore the study vide letter No CPMC/ IRB-No/ 1374.

Conflict of Interest: The authors declare no conflict of interest.

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Authors' Contribution

AS: Acquisition of data, analysis & interpretation of data, drafting of article, critical revision for important intellectual content, final approval

NM: Conception & design, drafting of article, critical revision for important intellectual content, final approval

UC: Conception & design, analysis & interpretation of data, drafting of article

NS: Analysis & interpretation of data, critical revision for important intellectual content, final approval

ZR: Analysis & interpretation of data, drafting of article, final approval

KB: Acquisition of data, drafting of article, final approval

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