Original Research Article

THE INFLUENCE OF ANEMIA ON MATERNAL AND NEONATAL OUTCOMES IN TEEN AGED PREGNANT WOMEN

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Abstract: *This retrospective study, conducted between October 2022 and October 2023 at Maroof International Hospital & Life Care International Hospital in Pakistan, aimed to assess the impact of anemia on neonatal and maternal outcomes in teenage pregnancies. The study included 585 pregnant women aged 13-19 years, with data collected on various parameters such as demographic details, pregnancy-related information, hemoglobin levels during the last trimester, birth weight, gestational age at birth, obstetric complications, neonatal intensive care admissions, and Apgar scores. Among the 585 participants, 212 (36.2%) were identified as having anemia. Further classification revealed that 57.5% experienced mild anemia, 39% had moderate anemia, and 3.5% had severe anemia. Educational status and irregularities in antepartum care showed significant differences between anemic and non-anemic groups (P < 0.05). Anemia was notably higher in women with lower education levels and irregular antenatal care. The study found that anemia significantly increased the risks of postpartum hemorrhage (P=0.005) and postpartum transfusion (P< 0.001). Additionally, infants born to anemic mothers exhibited a significantly higher rate of neonatal intensive care unit (NICU) admission (P<0.001). Maternal anemia was also significantly associated with low birth weight, small for gestational age (SGA), and preterm delivery. However, anemia had no significant impact on Apgar scores. In conclusion, the study underscores the prevalence of anemia in teenage pregnancies and emphasizes its adverse effects on both fetal and maternal outcomes. The findings highlight the urgent need for governmental initiatives to enhance essential healthcare accessibility and improve antenatal care for this vulnerable demographic.*

Keywords: Anemia, Young Pregnancy, Obstetric Complications, Neonatal Outcomes

Introduction

Anemia associated with pregnancy is a common nutritional disorder defined as hemoglobin level < 11g/d.(Soliman et al., 2022; Turawa et al., 2021) In Pakistan, the incidence of anemia in urban married women is 27%, while in rural women, it is 48%.(Zia-ud-Din et al., 2019) Though it can occur at any stage of life, it is most common in pregnant women and young children. Pregnancy during teen ages is a high-risk factor for anemia due to malnutrition and increased iron needs. Adolescents make up 23% of the population in developing countries. (Organization, 2011) Every year, about 16 million girls aged 15 to 19 give birth, mainly in developing countries. (Gu et al., 2021) In Pakistan, the prevalence of teenage pregnancy is 42.5% and is associated with factors like education, wealth, and place of residence. (Ali et al., 2022)

Young-age pregnancy is associated with high risks and can lead to various medical issues. Anemia, which is also one of the serious medical concerns, is associated with young pregnancy. Research has shown that adolescent pregnancy is associated with harmful pregnancy outcomes like pre-term birth, small for gestational age, low birth weight, and neonatal and post-neonatal pregnancy mortality; however, the impact of anemia on teenage pregnancy outcomes is still controversial.(Beckert et al., 2019) According to some studies, there is an association between anemia and adverse neonatal and obstetric outcomes, while other studies did not find any association. Thus, in this study, we will evaluate the impact of anemia on neonatal and maternal outcomes in teenage pregnant women in Pakistan.

Methodology

The retrospective study was conducted in Maroof International Hospital & Life Care International Hospital from October 2022 to October 2023. A total of 585 women were included in the study. Pregnant women aged 13-19 years who delivered in this hospital were included in the study. Informed consent of the participants was taken. The ethical board of the hospital approved the study.

Maternal age was the age at the delivery time and was obtained from the hospital's birth record. Demographic and pregnancy-related data were recorded, including hb level before birth (during the last trimester), birth weight, and gestational age at birth, obstetric complications, neonatal intensive care admission, and Apgar scores of infants. According to WHO, hemoglobin concentration < 11.0 g/L was considered anemia.

Maternal outcomes included preterm birth (< 37 weeks of gestation), type of delivery (cesarean/ normal vaginal), preeclampsia, gestational diabetes, postpartum hemorrhage, and postpartum transfusion (blood loss > 500 ml within 24

hours of birth). Neonatal outcomes included gestational age at birth, low birth weight (> 2500 g), small for gestational age (weight >tenth percentile), NICU admission, and APGAR score (5 minutes < 7 min).

SPSS version 23.0 was used for data analysis. Data was presented as mean and standard deviation or frequency and percentage. The Chi-square test was used to evaluate categorical variables. Mann Whitney U test was used for inter-group comparison. Logistic regression analysis evaluated the association between anemia and study variables. P value < 0.05 was considered statistically significant.

Results

The mean age of the participants was 18.95±1.09 years. Of 585 women, 468 (80%) had elementary or lower educational qualifications, and 117 (20%) had intermediate education. Only 58 (9.9%) were employed. 380(65%) women had > 4 antepartum care visits, 40 (6.9%) had 3 visits, 29 (4.9%) had 2 visits, 17 (2.9%) had 1 visit, while 119 (20.3%) had no follow-up care during pregnancy. 4

(0.6%) women had multiple pregnancies, and 5 (.8%) had stillbirths. Of 585 women, 212 (36.2%) had anemia, of which 57.5% had mild,39% had moderate, and 3.5% had severe anemia (Table I)—The distribution of gender is shown in Figure 1.

There was a significant difference in educational status and antepartum control in anemic and nonanemic women. Anemia was significantly higher in women who had lower educational status and irregular antenatal care (P< .05) (Table II).

The findings of the logistic regression analysis are summarized in Table II. It was found that anemia increased the risk of postpartum hemorrhage (P=.005)) and postpartum transfusion (P=0.0). There was no significant association between anemia and preeclampsia or type of delivery (P>.05) (Table II).

Infants of anemic women had significantly higher NICU admissions (P=0.0). Maternal anemia was also significantly associated with low birth weight, SGA, and preterm delivery. Anemia had no significant impact on Apgar scores (Table III).

Table I: Patients' baseline characteristics in anemic and non-anemic subjects

| Characteristics	Anemic women (n=212)	Non-anemic women (n=373)	P- Value
Median age	18 (13-19)	18 (13-19)	0.800
Median gestation age	40 (24-43)	40 (22-43)	0.288
Median birth weight	3120 (838-4388)	3090 (500-4320)	0.160
Median Hb	10.0 (6.3-11)	12 (11-15)	0.0
High school education	17 (8.1%)	100 (26.8%)	0.0
Employed	19 (9%)	39 (10.4%)	0.600
Regular antepartum control	127 (60%)	253 (67.8%)	0.0
Consumption of iron supplements during pregnancy	96 (45.3%)	186 (49.9%)	0.180
Fertility treatment	7 (3.4%)	20 (5.4%)	0.070
Mode of delivery			
Vaginal	134 (63.2%)	250 (67.1%)	0.090
Cesarean	78 (36.8%)	123 (32.9%)	
Gender of neonate			
Male	102 (48.2%)	189 (50.7%)	0.290
Female	110 (51.8%)	184 (49.3%)	
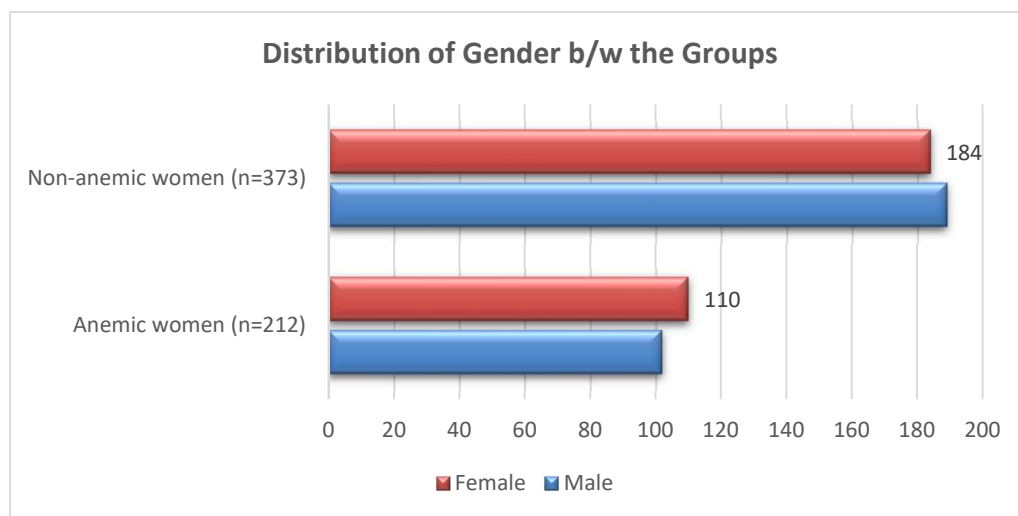
Figure 1 Distribution of gender between the groups

Table II: Patients' characteristics of anemia

Characteristics	95% CI	P-value
High school education	0.30 (0.18-0.38)	0.0
Employment	1.09 (0.80-1.60)	0.600
Regular antepartum control	1.55 (1.30-2.06)	0.0
Consumption of iron supplements during pregnancy	1.20 (0.88-1.50)	0.180
Fertility treatment	1.67 (0.90-3.20)	0.067

Table III: Logistic regression analysis of association between maternal and neonatal outcomes and anemic status

Outcomes	OR	95% CI	P-Value
Maternal Outcomes			
Anemic	0.78	0.70-1.10	0.088
Preterm birth	0.99	0.66-1.50	0.041
Preeclampsia	0.56	0.30-1.60	0.310
Gestational diabetes	1.09	0.86-1.37	0.281
Postpartum transfusion	0.07	0.10-0.19	0.0
Postpartum hemorrhage	0.16	0.10-0.88	0.005
Neonatal outcomes			
Birth weight less than 2500 g	0.98	0.70-1.50	0.051
Gestation age less than 37 weeks	1.05	0.75-1.52	0.541
Gestation age less than 34 weeks	1.07	0.60-2.10	0.910
Small for gestation age	1.10	0.68-1.70	0.002
5-minute APGAR less than 7	1.80	0.48-6.20	0.358
NICU	0.40	0.30-0.60	0.0

Discussion

This study highlights the impact of anemia on maternal and fetal outcomes in teenage pregnant women. It was found that anemia increases the risk of postpartum complications such as postpartum hemorrhage and transfusion. Analysis of fetal outcomes shows that infants of fetal patients are at higher risk of NICU admission. Anemia is a significant health concern globally, especially in pregnant women. According to WHO, about half a billion women of reproductive age have anemia, 38% of which are pregnant and 29% are nonpregnant. (Hasan et al., 2022) In this study, the frequency of anemia was 36.2%, which, according to WHO classification, is a moderate public health concern. A cross-sectional study on the prevalence of anemia in Pakistan reported that it ranges from 41.7% to 77% in different regions, which is considered a severe concern(Ali et al., 2020). The low frequency in our study group may be due to the urban location of the hospital and comparatively better socio-economic status than other areas. Adolescent pregnancy has adverse outcomes for both mother and infant; moreover, mental, physical, and social hardships faced by teenagers make more complicated problems. Most adolescent pregnant women have incomplete emotional, mental, and physical maturation; adolescent pregnant women face severe social consequences like school dropout and, consequently, lack of better employment opportunities.(Macedo et al., 2020) In our study, the majority of women also had low educational status and lower employment rates. It was found that low education level and irregular antepartum care was associated with anemia. These results were in line with the findings of previous studies, which reported that low socioeconomic status and education and few antenatal visits were associated with anemia during pregnancy.(Panting et al., 2019; Samsury et al., 2022) Antenatal control is essential for maternal and fetal outcomes and educates the mother about a balanced diet, good nutrition, and iron supplements to prevent anemia. A study was conducted on the effect of antenatal care on anemia and reported that anemia was corrected in 69.8% of women who had antenatal care.(BM Labib et al., 2022)

It was found that anemia had no significant impact on the type of birth and preeclampsia; however, anemia was significantly associated with postpartum transfusion and bleeding, gestational diabetes, and preterm birth. Previous studies have reported that anemia increases the risk of maternal mortality, diabetes, preeclampsia, and preterm birth.(Sousa et al., 2022; Sun et al., 2021) A study found that anemia was associated with postpartum hemorrhage and severe maternal complications at birth; this is similar to the finding of our study. (Sharma, 2019) Another study also found a significant association between anemia and postpartum infection, hemorrhage, and transfusion.(Wahabi et al., 2022) In the current study, anemia had a significant impact on infants' gestational age, birth weight, and SGA. Some previous studies have reported an association between anemia and these fetal outcomes.(Beckert et al., 2019; Figueiredo et al., 2019). In this study, maternal anemia resulted in significant NICU admissions, similar to the previous study's findings.(Eltayeb et al., 2023) They suggested that correcting anemia, even at the later stages of pregnancy, significantly prevents adverse outcomes. Similarly, another study also found that maternal anemia increases the risk of adverse perinatal outcomes. Healthcare staff needs to focus on maternal and neonatal complications in teenage anemic women.

The limitation of this study is its retrospective nature and small sample; more extensive studies are recommended for detailed analysis. All subjects belonged to the same demographic background, so the results are only specific to this socio-economic community; multicenter studies can

help produce generalized results. Only 3.5% of women had severe anemia, which was insufficient to evaluate the association between the severity of the condition and patient outcomes. Besides these limitations, our study is of significant importance as limited work has been done in adolescent pregnant women with anemia. However, prospective studies with distinct study groups will further clarify the association between anemia and patient outcomes in adolescent women.

Conclusion

Anemia is prevalent in teenage pregnant women and has adverse fetal and maternal outcomes. The government should improve primary health care and make antenatal care accessible.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

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Data acquisition, analysis.

References

Ali, A., Khaliq, A., Lokeesan, L., Meherali, S., and Lassi, Z. S. (2022). Prevalence and predictors of teenage pregnancy in Pakistan: a trend analysis from Pakistan Demographic and Health Survey datasets from 1990 to 2018. *International Health* **14**, 176-182.

Ali, S. A., Abbasi, Z., Shahid, B., Moin, G., Hambidge, K. M., Krebs, N. F., Westcott, J. E., McClure, E. M., Goldenberg, R. L., and Saleem, S. (2020). Prevalence and determinants of anemia among women of reproductive age in Thatta Pakistan: Findings from a cross-sectional study. *PloS one* **15**, e0239320.

Beckert, R. H., Baer, R. J., Anderson, J. G., Jelliffe-Pawlowski, L. L., and Rogers, E. E. (2019). Maternal anemia and pregnancy outcomes: a population-based study. *Journal of Perinatology* **39**, 911-919.

BM Labib, H., K Ahmed, A., and A Abd El-Moaty, M. (2022). EFFECT OF MODERATE IRON DEFICIENCY ANEMIA DURING PREGNANCY ON MATERNAL AND FETAL OUTCOME. *Al-Azhar Medical Journal* **51**, 1075-1086.

Eltayeb, R., Binsaleh, N. K., Alsaif, G., Ali, R. M., Alyahyawi, A. R., and Adam, I. (2023). Hemoglobin levels, anemia, and their associations with body mass index among pregnant women in Hail Maternity Hospital, Saudi Arabia: A cross-sectional study. *Nutrients* **15**, 3508.

Figueiredo, A. C. M. G., Gomes-Filho, I. S., Batista, J. E. T., Orrico, G. S., Porto, E. C. L., Cruz Pimenta, R. M., dos Santos Conceição, S., Brito, S. M., Ramos, M. d. S. X., and Sena, M. C. F. (2019). Maternal anemia and birth weight: A prospective cohort study. *PloS one* **14**, e0212817.

Gu, D., Andreev, K., and Dupre, M. E. (2021). Significant trends in population growth around the world. *China CDC weekly* **3**, 604.

Hasan, M. M., Magalhaes, R. J. S., Garnett, S. P., Fatima, Y., Tariqujjaman, M., Pervin, S., Ahmed, S., and Mamun, A. A. (2022). Anemia in women of reproductive age in low-and middle-income countries: progress towards the 2025 global nutrition target. *Bulletin of the World Health Organization* **100**, 196.

Macedo, T. C., Montagna, E., Trevisan, C. M., Zaia, V., de Oliveira, R., Barbosa, C. P., Laganà, A. S., and Bianco, B. (2020). Prevalence of preeclampsia and eclampsia in adolescent pregnancy: A systematic review and meta-analysis of 291,247 adolescents worldwide since 1969. *European Journal of Obstetrics & Gynecology and Reproductive Biology* **248**, 177-186.

Organization, W. H. (2011). "Evidence for gender responsive actions to prevent and manage adolescent pregnancy: young people's health as a whole-of-society response." World Health Organization. Regional Office for Europe.

Panting, A. J., Abdullah, H., Roslan, S., and Ismail, I. A. (2019). Potential Social Risk Factors for Teenage Pregnancy in Sarawak. *Pertanika Journal of Social Sciences & Humanities* **27**.

Samsury, S. F., Ismail, T. A. T., and Hassan, R. (2022). Low birth weight infant among teenage pregnancy in Terengganu, Malaysia: A cross-sectional study. *Malaysian Family Physician: the Official Journal of the Academy of Family Physicians of Malaysia* **17**, 44.

Sharma, T. (2019). A Comparative Study Of Rectal Misoprostol Versus Intravenous Oxytocin In Reducing Intra And Postoperative Bleeding During Elective Cesarean Section, BLDE (Deemed to be University).

Soliman, A. S., Ghanem, A. I., and Hammad, E.-S. M. (2022). Effect of Dietary Pattern on the Presence of Iron Deficiency Anemia among Adolescent Girls. *Bulletin of the National Nutrition Institute of the Arab Republic of Egypt* **59**, 154-180.

Sousa, V. T. d., Ballas, S. K., Leite, J. M., Olivato, M. C. A., and Cancado, R. D. (2022). Maternal and perinatal outcomes in pregnant women with sickle cell disease: an update. *Hematology, Transfusion and Cell Therapy* **44**, 369-373.

Sun, C.-F., Liu, H., Hao, Y.-H., Hu, H.-T., Zhou, Z.-Y., Zou, K.-X., Liu, X.-M., Sheng, J.-Z., Ding, G.-L., and Huang, H.-F. (2021). Association between gestational anemia in different trimesters and neonatal outcomes: a retrospective longitudinal cohort study. *World Journal of Pediatrics* **17**, 197-204.

Turawa, E., Awotiwon, O., Dhansay, M. A., Cois, A., Labadarios, D., Bradshaw, D., and Pillay-van Wyk, V. (2021). Prevalence of anaemia, iron deficiency, and iron deficiency anaemia in women of reproductive age and children under 5 years of age in south africa (1997–

2021): A systematic review. *International Journal of Environmental Research and Public Health* **18**, 12799.

Wahabi, H. A., Esmaeil, S., Elmorshedy, H., Bakhsh, H., Abdelrahman, A., and Fayed, A. (2022). Iron deficiency anemia in pregnancy: Subgroup analysis from Riyadh mother and baby multicenter cohort study (RAHMA). *Journal of Applied Hematology* **13**, 47.

Zia-ud-Din, Khan, Z., Ul Haq, Z., Iqbal, M., Iqbal, Z., Khan, I., Ahmed, Z., Paracha, P. I., and Asif, M. (2019). Dietary patterns, nutritional status and agricultural work performance of small-scale farmers in North West Pakistan. *Progress in Nutrition* **21**, 359-369.