Frequency and Severity of Anemia in Pregnant Women at Gwadar Development Authority Hospital, Gwadar, Balochistan

Majid Latif, Saeed bin Ayaz, Muhammad Usman Munir*, Laeeq Ur Rehman, Muhammad Anwar***, Mansoor Ishaq, Muneeba Manzoor****, Muhammad Aamir**

Combined Military Hospital Quetta/National University of Medical Sciences (NUMS) Pakistan, *Combined Military Hospital Panu Aqil/National University of Medical Sciences (NUMS) Pakistan, **Gwadar Development Authority Hospital, Gwadar Pakistan, ***Combined Military Hospital Mailsi/National University of Medical Sciences (NUMS) Pakistan, ****Government Hospital Ghaziabad, Lahore Pakistan

ABSTRACT

Objective: To determine the frequency and severity of anemia among pregnant women and find association of anemia with age, number of pregnancies, and the trimester of pregnancy at Gwadar Development Authority (GDA) Hospital, Gwadar, Baluchistan.

Study Design: A cross-sectional study.

Place and Duration of Study: Gwadar Developmental Authority Hospital, Gwadar Pakistan, from Sep 2017 to Feb 2018.

Methodology: Through consecutive sampling, we included 200 women diagnosed with pregnancy reporting for routine checkup. The samples were taken through antecubital veins using aseptic technique and the hemoglobin was analyzed using Medonic M-series M32 Hematology Analyzer. We used definitions of anemia given by the World Health Organization. The data were analyzed using SPSS version 20.

Results: The mean age was 26.2 ± 5.6 years (range: 17-43 years). The mean hemoglobin was 10.1 ± 1.4 g/dL while the mean values for mean corpuscular volume and mean corpuscular hemoglobin were 70.5 ± 10.1 f Land 24.1 ± 4.2 pg respectively. The frequency of anemia was 73% (n=146). Most (40%, n=80) women had anemia of moderate intensity. Mild anemia was most prevalent in the first trimester while moderate and severe anemia was in the third trimester. No significant interactions of woman's age, number of pregnancies, and the trimester of pregnancy were found with the presence of anemia.

Conclusion: The frequency of anemia among pregnant women attending GDA hospital was 73% with maximum women having moderate anemia. Woman's age, number of pregnancies, and the trimester of pregnancy did not have any significant association with anemia.

Keywords: Anemia, Age, Frequency, Gender, Gwadar, Hemoglobin, Pregnancy, Severity, Women.

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INTRODUCTION

Anemia is a major problem worldwide especially in the developing countries, which is aggravated in pregnancy due to increase in demand of iron. The anemia during pregnancy is the major reason behind increased susceptibility to infections, post partum hemorrhage, and risk of preterm birth during pregnancy.[1] The estimated prevalence of anemia during pregnancy is 18% in developed countries, whereas, it is between 35-75% in the developing countries.[2] Poor diet, high parity, nutritional deficiencies, inflammatory diseases, and helminthic infections are the primary risk factors for developing anemia during pregnancy in low income countries in South Asia and Africa.[3]

Women in Pakistan are suffering from anemia with an alarmingly high prevalence of 30-60%.[4] The women as compared to men are more prone to develop anemia due to chronic/repeated blood loss resulting from monthly menstrual cycles, pregnancies and deliveries, oral contraceptive pills, intra-uterine devices, and frequent urinary tract infections. Poor dietary supplementation and care during childhood and negligence towards own diet during motherhood are other factors attributed to anemia in South Asian women. Thesituation is expected to be worse in rural and underdeveloped areas like Gwadar. Our study was the first of its kind in this area to address anemia in pregnant women and create public health awareness for its effective control. This study evaluated the frequency and severity of anemia among pregnant women and its relation with age, number of pregnancies, and the trimester of pregnancy.

METHODOLOGY

This cross-sectional study was conducted atthe Department of Pathology, Gwadar Developmental

Correspondence: Dr Majid Latif, Classified Specialist Pathology, Combined Military Hospital, Quetta Pakistan.

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Authority (GDA) Hospital, Gwadar, Balochistan. A sample size of 133 was estimated via EpiTools Epidemiological Calculator while keeping level of significance 5%, confidence level 95%, and estimated true proportion 90.5%.[5] Through non-probability consecutive sampling,we included 200 pregnant women. The pregnant women within age range of 16-45 years reporting for routine checkup from September 2017 to February 2018 were included. Women with history of any chronic illness like tuberculosis, liver or kidney disease, and patients on iron supplements were excluded. We used definitions of anemia given by the World Health Organization (WHO) and used by Nair *et al*,[1] and Oztürk *et al*.[2] The hemoglobin level ≥11.0 g/dl was considered normal. Participants with hemoglobin level 10.0-10.9 g/dl were considered to have mild anemia, while hemoglobin levels.[7] 0-9.9 g/dl and <7.0 g/dl were defined as moderate and severe anemia respectively.

Demographicand hematological parameters were used to evaluatestudygroups. Demographic data includedage inyears, trimester of pregnancy, andnumber of live births. Laboratory investigations of all women were performed at GDAHospital Laboratory, Gwadar. Blood samples of thesubjects were drawn aseptically from antecubital veins in ethylene diamine tetra acidic acid (EDTA) tubesandanalyzed on Medonic M-series M32 Hematology Analyzer (Boule Medical AB., Spanga, Sweden).

Statistical package for social sciences version 20.0 (SPSS Inc., Chicago, IL, USA) was used for analysis of the data. Descriptive statistics were performed for age, trimester of pregnancy, and number of pregnancies. Categorical variables were expressed as counts and percentages. Pearson's Chi-squared test was usedinitially to check association between the severity of anemia and trimester of pregnancy. A new dependent variable was then generated i.e. "whether the woman had anemia or not" before running binary logistic regression analysis. Age, number of pregnancies, and the trimester of pregnancy were assumed as the independent variables. A *p*-value ≤0.05 was considered statistically significant.

RESULTS

A total of 200 pregnant women were finally included. The meanage for our study population was 26.2 ± 5.6 years (range: 17-43 years). The mean hemoglobin was 10.1 ± 1.4 g/dL (range: 6.1-13.4 g/dl) while the mean values for mean corpuscular volume and mean corpuscular hemoglobin were 70.5 ± 10.1 fL (range: 48-111 fL) and 24.1 ± 4.2 pg (range: 3.3-39 pg) respectively. One-hundred and forty-six (73%) women had hemoglobin below 10.9 g/dl and were labeled as suffering from anemia while 54 (27%) had normal hemoglobin levels. Among anemic women, 60 (30%) women had mild anemia, 80 (40%) had moderate anemia, and 6 (3%) had severe anemia. The distribution of the sample based on number of pregnancies and the trimester of pregnancy is given in Table-I.

Table-I: Table showing distribution of sample based on number of pregnancies and the trimester of pregnancy.

Number of Pregnancies	n (%)	Trimester of Pregnancy	n (%)
1	46 (23%)	1st Trimester	40 (20%)
2	40 (20%)	2nd Trimester	50 (25%)
3	48 (24%)	3rd Trimester	110 (55%)
4	18 (9%)		
5	20 (10%)		
6	18 (9%)		
7	6 (3%)		
8	4 (2%)		

Mild anemia was most prevalent in first trimester while moderate and severe anemia werein the third trimester (Table-II).

Table-II: Table showing cross-tabulation of categories based on hemoglobin levels with the trimester of pregnancy. (*p*= 0.099*).

Trimester of Pregnancy	Categories Based on Hemoglobin Levels			
	Normal Values	Mild Anemia	Moderate Anemia	Severe Anemia
	n (%)	n (%)	n (%)	n (%)
1st Trimester	8 (20)	16 (40)	16 (40)	-
2nd Trimester	16 (32)	18 (36)	16 (32)	-
3rd Trimester	30 (27.3)	26 (23.6)	48 (43.6)	6 (5.5)

**Pearson's Chi-squaredanalysis*

After running Chi-squared analysis for the trimester of pregnancy, no significant association was found with the presence of anemia (p=0.442). Therefore, the binary logistic regression analysiswas not carried out for the variable "trimester of pregnancy". The logistic regression analysis run for the woman's age and the number of pregnancies demonstrated no significant interactions of woman's age and number of pregnancies with the presence of anemia (Table-III).

Table-III: Table showing association of anemia with age and number of pregnanciesusing binary logistic regression.

Variables	Levels	Regression Coefficient	Odds Ratio	95% CI	*p*-value
Age	-	0.006	1.006	0.944-1.072	0.845
Number of pregnancies	-	-0.023	0.978	0.808-1.182	0.816

DISCUSSION

The frequency of anemia in our study was 146 (73%). While reviewing other studies of the similar category from Pakistan, we find that most studies have a comparable range of 68-77% for anemia frequency from different locations involving diverse ethnic groups.[6-10] Other studies have pointed out outliers at both extremes independent of specific location or geographic distribution. Haq and Asif,[11] reported a prevalence of 91% from Muzaffarabad, Azad Jammu and Kashmir and Ansari and colleagues,[5] reported a prevalence of 90.5% from Hyderabad, Sindh. On the other hand, prevalence of 19% and 24% have been reported by Adnan *et al*,[12] and Zehra *et al*,[13] from Muzaffarabad, Azad Jammu and Kashmir and Karachi. The regional data from India, Srilanka, Bangladesh, Nepal, and Iran have shown different prevalence too. Indian studies reveal a prevalence of 33% to 89%.[14] The prevalence is 7-29% in Srilanka.[15] In Nepal, the prevalence varies from 41% in the western areas,[16] to 47% in the eastern areas.[17] In Bangladesh and Iran, the recent studies show a prevalence of 34.7% to 37%,[18,19] and 6.3% to 24.9% respectively.[20] Thus, this variation suggests role of multiple factors other than just ethnicity and geographical location in determining the prevalence of anemia among pregnant women.

The majority of anemic womenin our study were in the moderate category. Moderate degree of anemia was seen in 40% (n=80) of the study population followed by mild anemia seen in 30% (n=60). The frequency of severe anemia was 6 (3%). Moderate anemia had been the most prevalent category in the studies conducted byHaq and Asif, Ahsan *et al*, Anjum and colleagues, Khalid and colleagues, andAdnan*et al*,[8,10-12,21] while Öztürkand colleagues, Chowdhury *et al*, Ansari and colleagues, Singh *et al*, Maskey and colleagues, Jahan *et al*, and Bhatti *et al*, found mild anemia to be the most prevalent.[1,5,9,16,17,19,22]

Though we could not find significant association of age, number of pregnancies, and the trimester of pregnancy with the prevalence of anemia similar to Anjum and colleagues,[13] and Bhatti *et al*,[22] many studies have established age, educational level, socioeconomic status, greater family size, dietary habits, smoking, complications during earlier pregnancies, body mass index, number of pregnancies, and the trimester of pregnancies as important determinants of anemia in pregnant women.[6-8,13,14,17,21,23-25]

The contributing factors in the women from low socioeconomic status are inadequate nutrition, unhygienic living conditions, high infection rate, and lack of health care facilities.[23] Poor education plays a role in inappropriate and deficient diet intake, early marriages, and inadequate utilization of health care facilities, short birth spacing, and little knowledge of antenatal care.[23]

The risk of anemia increases as the number of pregnancies increase. This could be due to the loss of iron and other nutrients during increased and repeated pregnancies.[23,24] The risk of anemia is maximum during the third trimester of pregnancy, since the iron demand reaches its maximum in this period and the risk of ante partumhemorrhage is higher.[23,25] Though, there is an increase in plasma volume and red cell mass, this increase is disproportionate and causes hemodilution, thereuponlowering the hemoglobin level.[23]

The risk of developing anemia increases with age of the mother. This may be due to a drop in erythropoiesis and metabolism that is influenced by age and higher incidence of co-morbidities such as postpartum hemorrhage, renal failure, and disseminated intravascular coagulation.[23,24]

The beneficial effect of iron supplementation on reduction of anemia incidence during pregnancy has beendocumented in various studies. Iron fortification of food especially flour can be an appropriate measure. Use of iron and multivitamin sprinkles or combination tablets are also effective.[24,25] The supplementation should be prescribed when a woman decides for pregnancy to makesure that adequate iron reserves are present during pregnancy andpostpartum period.[24,25] Initial evaluation before pregnancy, and frequent follow-ups and reminders during pregnancy and lactation period are very beneficial. Therefore, we recommend increasing awareness among women of child bearing age about consumption of balanced diet, iron supplementation,birth spacing, and antenatal care to prevent anemia during pregnancy.

There are a couple of limitations for this study. First, we did not ask about dietary habits of the sampled women and did not inquire into dietary customs of the local population. Also, questions about supplementation with iron or other nutrients were not included in the initial interview, thus association of anemia with the dietary habits could not be explored. Second, we could not evaluate the women for serum ironor any worm infestation due to unavailability of these tests in

Gwadar and the surrounding areas. Thus, we could not relate anemia to any of these etiologies.

CONCLUSION

The frequency of anemia among pregnant women attending GDA hospital was73% with maximum women having moderate anemia. Woman's age, number of pregnancies, and the trimester of pregnancy did not haveany significant interaction with anemia.

Conflict of Interest: None.

Author's Contribution

ML: Conceptaion, data collecton, manuscript writing, SBA:, MUM: Manuscript writing, analysis, LUR: Manuscript writing, data compilation, MA:, MI:, MM:, MA: Review.

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