Original Article

Hemoglobin Hurdles: A Physiological Exploration of Anemia's Impact on Pregnancy

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Abstract

Objective: To estimate the different complications that anemia may pose to maternal and child health.
Methodology: The current study was approved by the ethical board of the Sindh University Jamshoro Physiology Department in collaboration with the Department of Gynecology and obstetrics. The study was conducted from January 2023 to December 2023. A sample size of 308 pregnant patients was selected, and they were divided into two groups. The control group consisted of 130 non-anemic patients between the ages of 18 and 40. The study group was comprised of 178 patients who were labeled as anemic according to WHO guidelines. The hemoglobin was estimated by the blood complete picture report (CP), while the outcome of pregnancy in both anemic and non-anemic cases was entered in a specifically designed Performa. The Fischer exact and chi square tests were applied to identify significance. A P value less than 0.05 was considered significant.
Results: According to the statistical study, anemia and the specific and complex pregnancy outcomes are significantly correlated. Anemia and pregnancy outcomes are statistically significantly correlated, according to the chi square test. (df = 6, X2 = 15.19, and P value of 0.01).
Keywords: Anemia, Pregnancy, Outcome

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Introduction

Anemia during pregnancy might jeopardize a person's dreams and joys, even if pregnancy is the cornerstone of one's married life. Anemia is a deficiency of red blood cells or hemoglobin, and it continues to be a serious global public health concern, particularly for pregnant mothers. [1] According to the American College of Obstetricians and Gynecologists (ACOG), anemia, especially iron-deficiency anemia, should be checked for in every pregnant woman.[2] About 1.24 billion people are suffering from iron deficiency anemia (IDA), and among them, 32 million are women, and a large proportion of them are pregnant women. [3] The World Health Organization (WHO) states in its report that due to malnutrition, 35-75% of pregnant women are suffering from iron deficiency anemia, while it is 38% globally. [4] Anemia affects roughly 21.55% of pregnant women per thousand. [5] Hem iron is necessary for the production of hemoglobin, and 80% of the iron in the human body is utilized for this purpose. Decreased hemoglobin leads to defective transport of oxygen and disturbance of metabolism in the human body.[6]

According to the WHO, when hemoglobin concentrations in RBCs become less than 1 g/dl, it is called as Anemia.[7] Anemia is classified according to the intensity of hemoglobin deficiency: mild if it ranges between 10 and 11 g/dl, moderate between 7 and 10 g/dl, and severe if it is less than g/dl. [8] Anemia may be hypochromic if only hemoglobin (Hb) is deficient with normal RBC size; microcytic if hemoglobin and the size of the cells both decrease; and macrocytic if hemoglobin is decreased but the size of the cells increases. Microcytic anemia is caused by iron

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deficiency; Deficiency in folic acid and vitamin B12 is the cause of macrocytic anemia and hypochromic anemia occurs because of other causes, e.g., acute blood loss.[9] IDA is more prevalent in developing and poor countries due to nutritional deficiencies. It usually takes 840,000 deaths per year. [10] In a 2016 survey, IDA was considered one of the leading causes of morbidities and deaths throughout the world. [11] One of the most common consequences of maternal death in anemia is PPH. [12] IDA is caused either by a decrease in the intake of iron-rich foods or by different pathologies that result in anemia. Iron deficiency anemia leads to different complications in the human system, including cardiovascular disorders, neurological and cognitive complications, and immune system depression.[13]

Early weariness, lethargy, headaches, vertigo, and colour changes are all caused by anemia. Anemia causes serious difficulties for the mother and the fetus, as well as renal and cardiac failure. [14] Iron deficiency Anemia is the outcome of a long-term deficiency of iron in the diet and supplements. It usually leads to adverse fatalities in pregnancy and during labor. It may lead to antepartum hemorrhages, postpartum hemorrhage, stillbirth of babies, depression during and after pregnancy, and cessation of lactation after delivery. It also produces ill effects on newborn babies, e.g., low birth weight babies and neurodevelopmental defects. [15]

Methodology

The present study, which will run from January 2023 to December 2023, was given the go-ahead by the ethical board of the Sindh University Jamshoro Physiology Department in cooperation with the Department of Gynecology and Obstetrics. 308 patients were chosen as a sample, and they were split up into two groups.

The control group consisted of 130 non-anemic patients between the ages of 18 and 40. The study group was comprised of 178 patients who were labeled as anemic according to WHO guidelines. All the non-cooperative patients suffering from any other disease except anemia were discarded from the study. The hemoglobin level was monitored by the blood complete picture (Blood CP) report of the hospital laboratory. The maternal and fetal outcome data was incorporated into specifically designed Performa. Utilizing the program graph Pad Prism 9, the data was examined. The Fischer exact test and the Chi square test were used to obtain the P value. P-values less than 0.05 were considered significant.

Results

The pregnancy outcomes for patients who are anemic and those who are not are shown in table I. According to the statistical research, anemia and the designated pregnancy outcomes are significantly correlated. Anemia and pregnancy outcomes are statistically significantly correlated, according to the chi square test. P value: 0.01; X2: 15.19; df: 6.

The table II signifies that as the age increases in expectant mothers the challenges of maternal and fetal outcome increases. The P value was 0.001

Discussion

Anemia during pregnancy continues to be a pressing global health issue, with profound implications for both maternal and fetal well-being. This discussion synthesizes recent research findings from the past five

Table I: Maternal outcome in anemic versus non-Anemic women.

Variable	Normal delivery	APH	PPH	Pre-Eclampsia	Eclampsia	Abortion	Still Birth	Total	X2	df	P value
Non-Anemic (n=130)	105 (34.09)	4 (1.29)	7 (0.32)	3 (0.97)	4 (1.29)	4 (1.29)	3 (0.97)	130 (42.20)	15.19	6	0.01
Anemic (n=178)	108 (35.06)	11 (3.57)	14 (4.54)	13 (4.22)	11 (3.57)	10 (3.24)	11 (3.571)	178 (57.79)			
Total (n=308)	213 (69.15)	15 (4.87)	21 (6.81)	16 (5.19)	15 (4.87)	14 (4.54)	14 (4.54)	308 (100)			

Table II: Age wise outcome in both anemic and non-anemic females.

Variables	Normal outcome	Complicated outcome	Total	X2	Df	P value
Below 20 y	110(35.71)	24(7.79)	134(43.50)	30.14	2	0.0001
Between 21-30 y	70(22.72)	31(10.06)	101(32.79)			
Between 31-40 y	33(10.71)	40(12.98)	73(23.70)			
Total	213(69.15)	95(30.84)	308(100)			

years, shedding light on the multifaceted complications associated with anemia in pregnancy. The current study concludes that anemia leads to different complications in pregnancy involving both maternal and fetal health outcomes. The worst maternal outcomes were antepartum hemorrhage, postpartum hemorrhage, pre-Eclampsia, abortion, and stillbirth (P value 0.001). On the fetal side, intrauterine growth retardation, fetal distress, and low birth weight babies.

The above findings are consistent with the research findings of Smith et al.[16] who concluded that anemia produces ill health effects on pregnant mothers and their outcomes. Research by Chen et al in 2022 underscores the association between maternal anemia and adverse fetal out comes (17%).[17] Their findings highlight an increased risk of neural tube defects and developmental delays in infants born to mothers with untreated anemia. This emphasizes the critical need for early detection and intervention to safeguard fetal health. Recent data analyzed by Patel et al.[18] also confirm complicated outcomes in expectant mothers (18%). In 2024 Long-term follow-up studies, such as the work by Garcia et al.[19] in 2020, indicate that addressing anemia during pregnancy is not only essential for immediate outcomes but also for preventing later-life health issues in both mothers and their newborns. Longitudinal studies are recommended to provide valuable insights into the enduring impact of maternal anemia and reinforce the importance of comprehensive postpartum care.

Conclusion

Study underscores the ongoing significance of anemia in pregnancy and its profound implications for both maternal and fetal health. Adhering to the latest guidelines, understanding evolving global trends, and recognizing their enduring impact on long-term health are crucial for designing effective interventions and ensuring optimal outcomes for both mothers and their infants.

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