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Gestational Anemia and Pregnancy Outcomes: A Study of Operated Cases at EHS Laghouat

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Abstract

Gestational anemia is a major public health issue, particularly in developing countries where its prevalence reaches up to 56%. In Algeria, high prevalence rates have been documented, emphasizing the importance of preventive and management strategies. Defined by hemoglobin levels below 11 g/dl, this condition varies in severity and has serious implications for maternal and fetal health.

This prospective study, conducted at the EHS Mother and Child Hospital in Laghouat on 550 operated pregnant women, reveals a high prevalence of anemia (56.4%), predominantly in the hypochromic microcytic form. The majority of cases were mild (62.6%), while severe anemia, though rare (4.2%), was associated with an increased risk of severe complications, such as blood transfusions, postpartum hemorrhage, and maternal deaths (0.54%). Adverse fetal outcomes included intrauterine growth retardation (3%), prematurity (11.5%), and five intrauterine fetal deaths (1.5%).

These findings underscore the need to strengthen early screening, regular prenatal care, and iron and folic acid supplementation as per WHO recommendations. Multidisciplinary care is crucial to reduce the incidence of this condition and its impact on maternal and fetal health.

Introduction

Gestational anemia is a global public health problem, particularly in developing countries, where its incidence reaches 56%, compared to 20%-25% in developed countries (1). This frequent condition of varying severity is a major factor in maternal and fetal morbidity and mortality. In Algeria, prevalence rates vary significantly across regions but remain high. For instance, in Blida, the prevalence was 46.66% in 2008 (2), whereas studies reported 74% in Sidi Bel Abbès in 2009 and 45.46% in 2012 (3). In Tlemcen, a prevalence of 25.9% was observed in 2017 (4). These figures highlight the urgent need for effective prevention and treatment strategies.

Definition and Classification

Gestational anemia is defined by the WHO as a hemoglobin level below 11 g/dl. It is categorized as mild (10-10.9 g/dl), moderate (9.9-7 g/dl), and severe (below 7 g/dl) (5). This condition reflects insufficient red blood cell count or oxygen-carrying capacity to meet the body's physiological needs. A distinction is made between physiological anemia, caused by hemodilution due to disproportionate plasma volume expansion, and pathological anemia (6).

Anemias are classified into two major categories based on their pathophysiological mechanisms:

Central or hyporegenerative anemias result from impaired bone marrow production. Causes include structural abnormalities of the hematopoietic marrow, inadequate hormonal stimulation (erythropoietin), deficiencies in iron, vitamins, or folates, or the presence of erythropoiesis inhibitors (7).

Peripheral anemias arise from excessive destruction or significant loss of red blood cells.

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These include massive hemorrhages, hemolysis due to immunologic, infectious, or toxic factors, and corpuscular abnormalities like sickle cell disease or thalassemia (8).

Clinical Diagnosis

The WHO recommends systematic anemia screening during the first prenatal visit, followed by close monitoring at each subsequent visit. Clinical signs include pallor of the skin and mucous membranes, physical and mental fatigue, concentration issues, and a depressive tendency. Hypoxemia-related symptoms, such as dyspnea, muscle cramps, tachycardia, and excessive fatigue with moderate exertion, are common. Neurological symptoms (headaches, dizziness, tinnitus) and digestive disorders (glossitis, superficial gastritis) may also be present.

Diagnosis is confirmed through laboratory tests, including red blood cell count, hemoglobin concentration, and reticulocyte analysis. Complementary tests are guided by clinical suspicion (9).

Clinical Forms

Gestational anemia manifests in several forms:

1. **Physiological anemia**, characterized by hemoglobin levels around 11 g/dl due to natural hemodilution.
2. **True anemias**, including mixed deficiency anemias resulting from iron, vitamin, or folate deficiencies; inflammatory anemias, often secondary to urinary tract infections; constitutional anemias, such as sickle cell disease and enzyme deficiencies; and anemias due to red blood cell aggression (immunological hemolysis or mechanical damage, e.g., schizocytes). Obstetric complications, like HELLP syndrome, may exacerbate anemia (10).

Maternal and Fetal Complications

Gestational anemia increases the risk of spontaneous abortion, susceptibility to infections, preterm deliveries, and the need for blood transfusions. It also heightens intolerance to postpartum hemorrhages. For the fetus, complications include intrauterine growth retardation (IUGR), prematurity, and, in severe cases, intrauterine death. According to the WHO, severe anemia (hemoglobin levels below 7 g/dl) significantly increases the risks of prematurity and fetal growth restriction, as well as perinatal mortality (11) (12).

Preliminary Study Results

This prospective study conducted at EHS Mother and Child Hospital in Laghouat on a sample of 550 operated pregnant women reveals a high incidence of anemia. Among women undergoing cesarean sections or hemostatic hysterectomies, 310 were anemic, corresponding to a rate of 56.4%. The average age of patients was 31.5 years, ranging from 18 to 46 years. Hypochromic microcytic anemia was the most frequent form observed. (Table 1)

This epidemiological overview emphasizes the need for early screening, regular follow-up, and multidisciplinary management to mitigate the negative impacts of gestational anemia on maternal and fetal health.

Table 1: Interventions Performed Based on Age Among Anemic Pregnant Women

Age	Cesarean Deliveries	Percentage (%)	Hysterectomies	Percentage (%)
< 20 years	5	1.64	0	0
20–35 years	213	69.8	4	80
> 35 years	87	28.53	1	20
Total	**305**	**100**	**5**	**100**

The data from the table describe the characteristics of anemic pregnant women and their pregnancy outcomes, highlighting a high prevalence of anemia among the population

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studied. Of the women, 62.6% had mild anemia, 33.2% moderate anemia, and 4.2% severe anemia. Severe cases, though less frequent, were associated with an increased need for blood transfusions, with 21.3% of patients receiving preoperative transfusions and 9.67% requiring transfusions postoperatively.

Regarding demographics, 60% of the women were homemakers, while 40% were public employees. Socioeconomically, 60% belonged to the lower class, 30% to the middle class, and 10% to the upper class. In terms of parity, 69% were nulliparous, 13% were primiparous, 12% secundiparous, 6% multiparous, and 1% grand multiparous.

Obstetric history indicates that 57.4% had previously undergone a cesarean delivery, 0.32% had experienced an abortion, and 0.32% reported postpartum hemorrhage. The interspinous distance (EIC) was short in 57.4% of cases, normal in 11.6%, and not assessed for the remaining 31%. Additionally, 73% of the women had a history of anemia during previous pregnancies.

Delivery methods included vaginal delivery for 48.8%, cesarean sections for 29.6%, and low-forceps-assisted delivery for 21.6%. Regarding prenatal care, 63.4% attended regular consultations, 28.3% attended irregularly, and 8.3% did not attend any. Despite prenatal care, only 31.6% of women received iron supplementation, while 68.4% did not.

Gestational age at admission was between 37 and 41 weeks for 94.6% of the cases, below 37 weeks for 15%, and above 41 weeks for 6.8%. Among surgical interventions, prophylactic and emergency cesarean sections accounted for 49% each, while hemostatic hysterectomies were rare at 1%.

This dataset provides a comprehensive view of the clinical and obstetric profile of anemic pregnant women, emphasizing the prevalence and severity of anemia and its associated clinical implications.

Table 2: Characteristics of Anemic Pregnant Women and Pregnancy Outcomes

Characteristic	Number (n)	Percentage (%)
Occupation		
Homemakers	186	60
Public employees	124	40
Socioeconomic level		
Low	187	60
Middle	93	30
High	30	10
Parity		
Nulliparous	214	69
Primiparous	40	13
Secundiparous	37	12
Multiparous	17	6
Grand multiparous	2	1
Obstetric history (ATCDs)		
Cesarean deliveries	178	57.4
Abortions	1	0.32
Postpartum hemorrhage (PPH)	1	0.32
Interspinous distance (EIC)		
Short	178	57.4
Normal	36	11.6

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Characteristic	Number (n)	Percentage (%)
Primiparous	96	31
History of previous pregnancies with anemia		
Yes	170	73
No	176	27
Mode of delivery		
Vaginal delivery	149	48.8
Low forceps	67	21.6
Cesarean section	90	29.6
Prenatal consultation (PNC)		
No consultation	25	8.3
Irregular PNC	85	28.3
Regular PNC	190	63.4
Iron supplementation		
Yes	98	31.6
No	212	68.4
Gestational age at admission		
Gestational age < 37 weeks (GA < 37 SA)	45	15
GA between 37 weeks and 41 weeks	284	94.6
GA > 41 weeks	21	6.8
Indication for surgical intervention		
Prophylactic cesarean section	149	49
Emergency cesarean section	149	49
Hemostatic hysterectomy	5	1

The data from the table 2 describe the characteristics of anemic pregnant women and their pregnancy outcomes. A majority of the women (60%) were homemakers, while 40% were public employees. Socioeconomically, 60% belonged to the lower class, 30% to the middle class, and 10% to the upper class. Regarding parity, 69% were nulliparous, 13% were primiparous, 12% secundiparous, 6% multiparous, and 1% grand multiparous.

Obstetric history reveals that 57.4% had undergone a cesarean delivery, 0.32% had experienced an abortion, and 0.32% reported postpartum hemorrhage. The interspinous distance (EIC) was short in 57.4% of cases, normal in 11.6%, and not assessed for the remaining 31%. Among the women, 73% had a history of anemia during previous pregnancies, while 27% did not.

The mode of delivery shows that 48.8% delivered vaginally, 21.6% required low forceps, and 29.6% underwent cesarean sections. Regarding prenatal consultations, 63.4% attended consultations regularly, 28.3% irregularly, and 8.3% did not attend any. Iron supplementation was reported in 31.6% of cases, while 68.4% did not receive supplementation.

In terms of gestational age at admission, 94.6% were between 37 and 41 weeks, 15% were below 37 weeks, and 6.8% were above 41 weeks. Surgical interventions included prophylactic cesarean sections and emergency cesarean sections, both at 49%, while hemostatic hysterectomies accounted for 1%.

Maternal complications identified among anemic women included retroplacental

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hematoma (0.32%), placenta previa (1.3%), and postpartum hemorrhage (1.3%). More severe conditions, such as disseminated intravascular coagulation (0.64%) and pulmonary embolism (0.32%), were also documented. A total of three maternal deaths (1%) were recorded, attributed to hemorrhagic complications or pulmonary embolism associated with COVID-19. However, the majority of women (97%) experienced no maternal complications, indicating generally favorable outcomes for most cases.

In terms of preoperative hemoglobin levels, mild anemia was the most prevalent, affecting 62.6% of the patients, followed by moderate anemia in 33.2% and severe anemia (<7 g/dl) in 4.2%. The severity of anemia necessitated medical interventions, including preoperative blood transfusions in 21.3% of the women and postoperative transfusions in 9.67%.

From a fetal perspective, adverse outcomes included intrauterine growth restriction (IUGR) in 3%, prematurity in 11.5%, and intrauterine fetal death (IUFD) in 1.5%. Despite these complications, 87.1% of neonates were delivered without any issues, highlighting the effectiveness of obstetric management in most cases.

Table 3: Maternal-Fetal Morbidity and Mortality

Category	Subcategory	Frequency (n)	Percentage (%)
Preoperative Hemoglobin Levels (g/dl)	Mild anemia	194	62.6
	Moderate anemia	103	33.2
	Severe anemia (<7 g/dl)	13	4.2
Preoperative Blood Transfusion	Yes	66	21.3
	No	244	78.7
Postoperative Blood Transfusion	Yes	30	9.67
	No	280	90.32
Maternal Complications	Retroplacental hematoma	1	0.32
	Placenta previa	4	1.3
	Postpartum hemorrhage	4	1.3
	Disseminated intravascular coagulation	2	0.64
	Pulmonary embolism	1	0.32
	Maternal death	3	1
	No complications	301	97
Fetal Morbidity and Mortality	Intrauterine growth restriction (IUGR)	9	3
	Intrauterine fetal death (IUFD)	5	1.5
	Prematurity	36	11.5
	No complications	272	87.1

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Recommandations

To reduce the incidence and severity of gestational anemia, several measures should be implemented:

First, it is essential to raise awareness among pregnant women about the importance of prenatal care, with an emphasis on performing systematic laboratory assessments during the initial consultations. Early detection of anemia's underlying causes enables prompt and targeted management.

Second, adherence to the World Health Organization (WHO) recommendations on iron and folic acid supplementation is critical. A daily intake of 30 to 60 mg of elemental iron combined with 0.4 mg of folic acid is recommended to prevent maternal anemia, puerperal infections, low birth weight, and preterm births. For women experiencing side effects from daily supplementation, an intermittent regimen of 120 mg of elemental iron and 2.8 mg of folic acid once per week can be considered.

Nutritionally, a diet rich in iron and folic acid—such as meat, fish, fruits, and vegetables—should be encouraged, with attention to optimizing their bioavailability. It is also advisable to avoid consuming tea and coffee during or close to meals, as these beverages can interfere with iron absorption.

Lastly, efforts should be made to promote voluntary blood donation, particularly in areas where the availability of blood products is limited. These strategies, combined with improved nutritional education, will play a significant role in reducing anemia-related complications during pregnancy.

Conclusion

Gestational anemia remains a significant public health issue due to its high prevalence and substantial impact on maternal and fetal health. Our study confirmed that iron deficiency anemia is the primary cause, associated with severe complications such as prematurity, intrauterine growth restriction, and postpartum hemorrhage. In extreme cases, these complications can lead to maternal or fetal mortality.

Effective prevention requires systematic screening during the first prenatal consultation and the implementation of iron and folic acid supplementation in line with WHO recommendations. Additionally, nutritional education and access to quality healthcare must be strengthened, particularly in high-risk areas.

These measures will help reduce the incidence and severity of gestational anemia, ultimately improving maternal and neonatal outcomes.

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