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Evaluation of Hematologic Exams in Parturient Adolescents Assisted at a Public Hospital in Brazil

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Abstract

Pregnancy during adolescence is a high-risk condition that prompts research interest due to frequent obstetrics complications in this age group. We aimed to identify potentially significant hematologic alterations in parturient adolescent patients at a public hospital in Goiania, Goiás State, Brazil. Data from the medical charts of 45 parturient adolescents (aged 10 to 19 years) seen from 2013-2014 were analyzed, including their hemogram results, neonatology records, and labor and delivery notes. We found that 31 (68.9%) parturients presented with anemia with low values of erythrocytes and hematocrit. The average gestational age in the anemic patients was 35.7 weeks, which was significantly lower in anemic patients ($p < 0.016$). These patients had significantly fewer prenatal visits compared with non-anemic patients ($p = 0.023$). Increased neonatal complications, especially prematurity and low birth weight, were observed with respect to anemic patients. Anemia is a common adolescent parturient complication linked to poor neonatological and maternal outcomes that could be alleviated by nutritional counseling and subsidies, as well as consistent hematological monitoring throughout the pregnancy through frequent prenatal visits.

Keywords

Adolescent pregnancy, Hemogram, Prematurity, Anemia

Introduction

Pregnancy during adolescence is a major public health issue, as many youth achieve sexual maturity before reaching social and emotional maturity or economic independence [1-3]. Adverse outcomes in adolescent pregnancies have been reported as important factors impacting women's general health, economic status, increased risk of abortions, and increased perinatal mortality [4,5].

Adolescent pregnancy is a high-risk condition that can predispose the patient to obstetric intercurrences, such as hypertension, urinary infection, depression, hematologic changes, and gestational diabetes, all of which directly influence maternal and perinatal morbidity and mortality rates. Fetal intercurrences include increased risk of prematurity, lower birth weight, lower Apgar score, intrauterine growth restriction and acute distress [6-11].

If the pregnancy occurs during adolescence, an increased risk of nutritional deficiencies arises due to both the fetus' and mother's concurrent development and growing nutritional needs. Such deficiencies are often associated with serious maternal-fetal consequences, especially among lower socioeconomic classes who may have limited food resources [12]. Specifically, increased blood volume and subsequent iron demand may lead to iron-deficiency anemia [13], the most frequent and worrisome type of anemia [14,15]. Low socioeconomic status, higher number of previous births, inadequate iron reserves, absence of iron supplementation, and iron-deficient diets are among the most important causes or predisposing risk factors for anemia during pregnancy [11].

Anemia is associated with higher incidence of maternal-fetal morbidity and mortality, although its diagnosis during pregnancy is sometimes impaired by pregnancy-related physiological hemodilution. In this condition, women are commonly asymptomatic or may present with few symptoms that can be attributed to expected physiological changes during pregnancy. Thus, knowing a woman's iron status prior to conception could aid in diagnosis of anemia and establishing her baseline iron reserve prior to pregnancy [16,17]. Over half of pregnant women in developing countries (56%) have iron and folic acid deficiencies related to poor nutrition or infectious diseases that gradually contribute to development of anemia in pregnant women but are more pronounced in adolescents [11].

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Table 1: Obstetric data from the patient records included in our study.

Obstetric data	Anemic n (%)	Non-anemic n (%)
First pregnancy	31 (68.9)*	9 (20)
Previous pregnancies	5 (11.1)	0
Type of delivery		
Cesarean section	35 (77.8)	7(15.5)
Vaginal	1 (2.2)	2 (4.5)
Pre-natal consultations		
< 06 consultations	32 (71.1)	8 (17.8)
≥ 06 consultations	4 (8.9)**	1 (2.2)

*Chi-square test or Fisher's exact test $p < 0.038$; **Chi-square test or Fisher'smexact test $p < 0.023$, n: number of cases.

Table 2: Neonatal data from newborns of patients in our study.

Newborn variables	Anemic n (%)	Non-anemic n (%)
GA mean (weeks)	35.7*	37.9
Term	4 (8.9)	7(15.5)
Preterm	32 (71.1)	2 (4.5)
Mean weight at birth (grams)	2455 grams**	2971grams
Neonatal complications		
ARF	5 (11.1)	1 (2.2)
MAS	9 (20)	3 (6.7)
NBTT	10 (2,2)	0
RDS	12 (26,7)	2 (4,4)

GA: Gestational Age; ARF: Acute Respiratory Failure; MAS: Meconium Aspiration Syndrome; NBTT: Newborn's Transitory Tachypnea; RDS: Respiratory Discomfort Syndrome.

n: number of cases, *Chi-square test or Fisher's exact test $p < 0.016$ **Chi-square test or Fisher's exact test $p < 0.046$.

Due to lack of studies focusing on anemia and related clinical alterations in pregnant adolescents, despite their significant effect on the mother's and baby's health, we investigated possible correlations between hematological changes in pregnant adolescents and neonatal intercurrences. As a result, we recommend providing subsidies to prenatal care programs that aid this specific population to improve their nutritional intake and dietary education.

Methods

We conducted a cross-sectional, retrospective quantitative study of data collected from the medical records of 45 pregnant adolescents between the ages of 10 and 19 years who were seen at a public hospital in Goiânia-GO, Brazil, from December 2013 to November 2014. Medical records with inaccurate clinical or laboratory notes were excluded from the study.

We studied the following maternal variables: sociodemographic characteristics (gender, age, marital status, education, occupation), obstetrics (duration and type of pregnancy, type of delivery, number of prenatal consultations, complications, and life habits) and laboratory findings (hemoglobin values, hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), leucogram, and platelet count). Selected newborn (NB) variables included date of birth, anthropometric data, gestational age, and any neonatal complications. The control group consisted of adolescents who had normal hemogram results. Preterm pregnancy was defined as a delivery occurring before the 37th week of pregnancy.

We analyzed quantitative data through descriptive statistics using frequencies, means, percentages, and standard deviation. We applied the Chi-square and Fisher's exact test to verify the association between neonatal or maternal clinical changes and the occurrence of alterations in maternal complete blood count values. We considered changes to be statistically significant when $p < 0.05$.

Results

We initially analyzed 72 records of pregnant adolescents but excluded 27 records due to archiving errors. Thirty-one adolescents (68.9%) presented with anemia. Adolescents who were pregnant for the first time presented with anemia more frequently and attend a lower number of pre-natal consultations, and these results are statistically significant ($p < 0.038$, $p < 0.023$). Obstetric data from the pregnant adolescents regarding parity, mode of delivery, and number of prenatal consultations are shown in table 1. The description of NB variables, including gestational age (GA), birth weight, and postnatal complications are presented in table 2. The mean GA of the anemic group was 35.7 weeks, which was significantly lower than NBs from the non-anemic group ($p < 0.016$).We also observed NBs of anemic patients had lower birth weights and more frequent postnatal complications than NBs of non-anemic patients ($p < 0.046$).

Maternal complications during pregnancy included premature rupture of membranes [13 (28.9%) patients] and gestational hypertension [GH, 24 (53.3%) patients]. Eight patients (17.8%) presented with urinary tract infection (UTI). Twenty-five patients (55.5%) had type O blood, 12 (26.7%) had type A, 7 (15.6%) had type B, and 1 (2.2%) had type AB. Alterations in complete blood counts included decreased red blood cell values in 32 patients (71.1%), hemoglobin in 36 patients (80%) and hematocrit in 33 patients (73.3%) compared to reference values. In addition, 9 patients (20%) presented with abnormal MCV, 20 (44%) with abnormal MCH and 12 (26.5%) with abnormal MCHC. However, MCV, MCH and MCHC values were not significantly different between the non-anemic and anemic patient groups.

Twenty-three patients (51.1%) presented with leukocytosis and 12 patients (26.7%) presented with thrombocytopenia. We saw no other alterations regarding total white blood cell or platelet counts. Analysis of the above hemogram results showed a statistically significant difference between patients in the non-anemic and anemic groups. Anemic patients exhibited a significant decrease ($p < 0.05$) in red blood cell ($4.2 \pm 0.1 \times 3.6 \pm 0.04$), hemoglobin ($12.3 \pm 0.2 \times 10.7 \pm 0.1$), and hematocrit ($38.13 \pm 0.5 \times 31.98 \pm 0.4$) values.

Discussion

We observed that most adolescents in our study in their first pregnancy have anemia and that nearly 70% of the patients showed decreased hematocrit values. Patients with abnormal hematocrit values had the least number of prenatal visits, underscoring the importance of adequate prenatal visits for diagnosing and preventing anemia during pregnancy. These results also reinforce the importance of encouraging frequent prenatal visits so adolescents can be consistently counseled and their hematological changes can be monitored and controlled throughout the pregnancy [15]. Previous studies have shown that iron-deficiency anemia is more common during the first pregnancy and often presents as normocytic (40% of cases) [11]. Similarly, we observed normal MCV and MCH in most of our anemic patients, highlighting the prevalence of normocytic and normochromic anemia in this population [11]. Another important factor impacting NB health is their gestational age at birth, which can lead to higher rates of NB morbidity and mortality. Most of the adolescents in our study had a preterm delivery, which was expected due to reproductive system immaturity, inadequate weight gain during pregnancy, and sociocultural factors, such as poverty and social marginality [18-21].

The etiology of anemia varies and can result from blood loss, excessive destruction of erythrocytes, or iron deficiency [22,23]. Obstetric complications in anemic parturient adolescents include post-partum hemorrhage, GH, and chronic anemia [24]. Specifically, iron-deficiency anemia is linked topreterm labor and low NB birth weight, which is twice as likely to occur in anemic patients as those who are non-anemic [25]. Over half the patients in our study presented with GH, especially those with normocytic, normochromic anemia or leukocytosis.

The incidence of UTI persists and peaks due to increased sexual activity or during pregnancy or menopause, as a result, 48% of women develop at least one UTI during their lifetime. During pregnancy, the prevalence of asymptomatic bacteriuria is approximately 10, and its

lack of diagnosis can lead to increased risk of preterm labor, low NB birth weight, and greater neonatal mortality and maternal morbidity [26]. In our study, only 3 patients were diagnosed with a UTI.

During pregnancy, increased maternal blood volume can make assessment of anemia difficult, although the prevalence of gestational anemia may be as high as 40% [15]. Isolated and associated determinations of hemoglobin from serum iron measurements are inadequate methods to characterize iron-deficiency anemia, as many patients with iron disorders confirmed by ferritin analysis do not present with abnormal serum iron values [25]. Mild anemia is noted when the patient's iron value is lower than 11 g/dL, which was observed in 80% of the patients in our study. Nearly 15% of these patients also presented with abnormal hematocrit values, likely due to the hemodilution of the patients' blood or their iron deficiency, which can result from a long-term hemogram imbalance [25,26]. After iron reserves are depleted, decreased plasmatic iron supplies to the bone marrow are insufficient to form hemoglobin [27]. Intake of some micronutrients, such as folic acid and vitamin C, and direct iron supplementation can reduce the occurrence of anemia [28,29] in many patients.

First-time parturient adolescents present with anemia more frequently and attend fewer prenatal consultations than those with previous pregnancies. Moreover, NBs of anemic adolescents had a lower mean gestational age compared to those non-anemic patients. Our results, taken together with those from previous studies, show that pregnant adolescents with anemia also experience a higher frequency of maternal and fetal intercurrences, thus demonstrating the importance of consistent and comprehensive prenatal care in this population, such as medical monitoring, counseling, and nutritional subsidies, to limit such complications.

Ethical Statement

The study was approved by the Ethics Committee of Medical Human and Animal Research of the Clinical Hospital at Universidade Federal de Goiás (UFG) (protocol number 101/2008).

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