ORIGINAL RESEARCH

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Prevalence of Anemia: Figures at the Time of Pregnancy Detection in Our Hospital

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ABSTRACT Objective: The aim of this study was to identify the prevalence of anemia in pregnant women at the time of pregnancy detection. **Material and Methods:** A retrospective study was conducted on 11582 women who had diagnosis of pregnancy between 2012 and 2019. Patients were divided into 3 groups according to the hemoglobin (Hb) levels of patients by their age. Pregnant women ≤19 years of age were defined as Group 1, 20-34 years of age as Group 2, and ≥35 years of age as Group 3. Anemia was defined as a hemoglobin level of <11 g/dL. **Results:** The overall prevalence of anemia at the time of pregnancy diagnosis was 21.95%. The average Hb level was 11.7±1.4 g/dL, 12±1.4 g/dL, 12±1.4 g/dL, and 11.9±1.4 g/dL in Groups 1, 2, 3, and entire study cohort, respectively. When severity of anemia was evaluated within the groups; Group 1 consists of 21.96% (n:181) mild anemia, 4.73% (n:39) moderate anemia, and 1.69% (n:14) severe anemia, Group 2 consists of 16.33% (n:1459) mild anemia, 4.44% (n:397) moderate anemia, and 0.67% (n:60) severe anemia, and Group 3 consists of 16.83% (n:307) mild anemia, 4.05% (n:74) moderate anemia, and 0.65% (n:12) severe anemia cases. **Conclusion:** The prevalence of anemia during pregnancy was different in age groups. Therefore, each clinic should divide its pregnant women into different age groups and evaluate the frequency of anemia.

Keywords: Anemia; pregnancy; adolescent; advanced maternal age

Anemia is one of the most common pregnancy-related complications.[1,2] According to World Health Organization (WHO) definitions, pregnant women with hemoglobin (Hb) values less than 11 g/dL are considered anemic who are further classified as mild (9.5-10.9 g/dL), moderate (7-9.4 g/dL), and severe (below 7 g/dL). The prevalence of anemia depends on multiple factors including the development status of the living place, genetic traits, lifestyles, and eating habits of people. During pregnancy, anemia is detected in 35% to 75% of pregnant women in developing countries in comparison to 18% in developed countries.[3] Pregnancy-related anemia most often results from acute blood loss taking place during labor and arises in the form of iron-deficiency anemia (IDA).[4] Maternal anemia in pregnancy is commonly associated with preterm delivery, premature birth, and poor pregnancy outcome.[5,6] Therefore, Republic of Turkey Ministry of Health recommends starting iron therapy in all pregnant women (regardless of they are anemic or not) at a dose of 40-60 mg/day.[7]

Adolescent pregnancy is childbearing at the age period of 10 to 19 years;[8] and pregnant women over the age of 35 are considered to be at advanced maternal age (AMA) according to WHO gestational age classification.[9] Recent studies demonstrated that adolescent pregnancies are prone to more than a 2-fold increased rate of anemia due to nutritional problems in comparison to pregnancies at other age groups. In adolescent pregnancies complicated by anemia, there

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is a risk of low birth weight, preterm birth, neonatal morbidity and increased mortality.[10] On the other hand, pregnancies at AMA are closely related to complications. Due to complications that may occur during delivery (uterine atonia, preeclampsia, invasive placenta), maternal morbidity and mortality may increase.[11] Hb levels become important at the later stage of pregnancy, closer to the date of confinement.

In the present study, we aimed to determine the prevalence of anemia in adolescent age, normal age, and AMA pregnancies followed up in our hospital.

METHODS

This is a retrospective study conducted in Muğla Sıtkı Koçman University Training and Research Hospital, Department of Gynecology and Obstetrics. Approval of the local ethics committee was obtained for this study (Date:18.06.2020, Decision No:06/3). The study was conducted in accordance with the Helsinki Declaration.

We enrolled 11,582 women who referred to our hospital between 2012 and 2019, for whom the diagnosis of pregnancy was established upon detection of fetal heartbeats with ultrasonography (USG). Routine complete blood counts (CBC) were carried out for all pregnant women. Patients' data were accessed through our internal data processing system (Karmed Data Processing Systems). Age and Hb level were recorded for each patient at the first antenatal visit.

Blood samples were collected into ethylene diamine tetraacetic acid (EDTA) containing blood tubes by venipuncture once patients were admitted to the clinic. CBC parameters were analyzed using a Sysmex XN-1000 hematology analyzer (Sysmex, Kobe, Japan). In accordance with the WHO recommendations, pregnant women with Hb values less than 11 g/dL were considered anemic and they were further classified as mild (9.5–10.9 g/dL), moderate (7–9.4 g/dL), and severe (below 7 g/dL).[12]

Patients were divided into 3 groups according to the Hb levels of patients by their age. Such that, patients ≤19 years of age were defined as Group 1, 20-34 years of age as Group 2, and ≥35 years of age as Group 3. Hb levels were compared in the entire cohort of patients and among the age groups.

Statistical analysis was done using SPSS software (IBM SPSS Statistics, Version 22.0. Armonk, NY: IBM Corp). Our null hypothesis stated that there were no differences in the levels of Hb among the age groups. Shapiro-Wilk test was used to evaluate the distribution of variables. Variables with a normal distribution were presented as mean±standard deviation (SD) and non-normally distributed variables were presented as median and quartiles (25^{th}-75^{th} percentiles). Differences among the groups for each parameter were analyzed by one-way analysis of variance (ANOVA) using Tukey correction for normally distributed parameters and Kruskal-Wallis test for non-normally distributed parameters. P-values less than 0.05 were considered statistically significant.

RESULTS

A total of 11,582 pregnant women were included in our study. The mean age of the patients was 28.0±6.0 years (min 13 and max 56). Groups 1, 2, and 3 were comprised of 824, 8934, and 1824 patients, respectively. The average Hb level was 11.7±1.4 g/dL, 12±1.4 g/dL, 12±1.4 g/dL, and 11.9±1.4 g/dL in Groups 1, 2, 3, and entire study cohort, respectively. In Groups 1, 2, and 3, the average ages were 18.0±1.0, 27.0±4.0, and 38.0±3.0 years, respectively (Table 1).

Based on the screening tests in the first trimester, 16.81% (n:1947) of women had mild anemia, 4.40% (n:510) had moderate anemia, and 0.74% (n:86) had severe anemia (Table 2). The overall prevalence of anemia at the time of pregnancy diagnosis was 21.95% (n:2543). When severity of anemia was evaluated within the groups; Group 1 consists of 21.96% (n:181) mild anemia, 4.73% (n:39) moderate anemia, and 1.69% (n:14) severe anemia, Group 2 consists of 16.33% (n:1459) mild anemia, 4.44% (n:397) moderate anemia, and 0.67% (n:60) severe anemia, and Group 3 consists of 16.83% (n:307) mild anemia, 4.05% (n:74) moderate anemia, and 0.65% (n:12) severe anemia cases (Table 3).

Hb levels of pregnant women were lower in Group 1 compared to other age groups as presented in Table 1 and Figure 1 ($p<0.001$).

TABLE 1: Hemoglobin levels of pregnant women in different age groups.

	Group 1 (≤19 age, n:824)	Group 2 (20-35 age, n:8934)	Group 3 (≥35 age, n:1824)	Entire group (13-56 age, n:11582)
Hemoglobin (g/dL)	*11.7±1.4	12±1.4	12±1.4	11.9±1.4
Age (years)	18±1	27±4	38±3	28±6
Data are presented as mean ± SD				

* indicating statistically significant differences between groups

TABLE 2: Ages and hemoglobin levels of pregnant women in anemia groups.

	Severe anemia (Hb<7)	Moderate anemia (7≤Hb<9.5)	Mild anemia (9.5≤Hb<11)	No anemia (11≤Hb)
n, %	86, 0.74%	510, 4.40%	1947, 16.81%	9039, 78.05%
Hemoglobin (g/dL)	7.4±0.6	8.9±0.4	10.3±0.4	12.5±0.9
Age (years)	*26±6	28±6	28±6	28±6
Data are presented as mean ± SD				

* indicating statistically significant differences between groups

TABLE 3: Hemoglobin levels and anemia status in age groups.

	Group 1 (Age ≤19 years, n:234)			Group 2 (20≤Age<35 years, n:1916)			Group 3 (Age ≥35 years, n:393)		
	Sever	Moderate	Mild	Severe	Moderate	Mild	Severe	Moderate	Mild
n, %	14, 1.7	39, 4.7	181, 22.0	60, 0.7	397, 4.4	1459, 16.3	12, 0.7	74, 4.1	307, 16.8
Hemoglobin (g/dL)	7.5±0.3	8.8±0.4	10.3±0.4	7.3±0.6	8.9±0.4	10.3±0.4	7.2±0.9	8.9±0.4	10.3±0.4
Data are presented as mean ± SD									

DISCUSSION

Anemia is a common public health concern across the globe. Particularly in women of reproductive age, iron deficiency is the most frequent reason for anemia. For this reason, development status in a country has strong connections with the anemia prevalence among its inhabitants. According to the WHO data, the prevalence of anemia is lowest in North America where a rate of 6% was reported compared to 14% in Europe.[13] This rate reaches up to 75% in Gambia.[12] Studies conducted in our country have come up with various results.

In the study by Davas *et al.* implemented in 2006, an anemia rate of 74.1% was identified. The study with the lowest rate of anemia was published in 2016 and was conducted by Küçükceren and colleagues [14] who investigated 200 patients in Ankara and detected 13.15% of them had anemia. They identified risk factors of anemia as duration of shorter than 2 years between two successive pregnancies and tea consumption in large quantities. In our study, anemia rate in the general population was 21.95%. Of note, our sample size was quite greater than the number of patients included in previous studies.

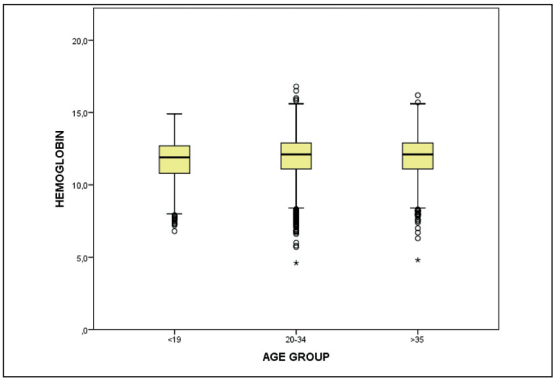

FIGURE 1: Comparison of hemoglobin levels in different age groups.

When we reviewed the studies which have reported mean Hb levels, the lowest levels were documented by Harma et al. who conducted a study in

Sanliurfa among grand multiparous women with an average level of 10.4±1.9 g/dL.[15] Mean Hb levels determined in studies of Küçükceren et al. and Kesgin et al. were 12.7±0.93 g/dL and 12.6±1.02 g/dL, respectively. The above-mentioned figures are the highest ones among the results of the articles we have reviewed. In our cohort, the mean Hb level was 11.9±1.4 g/dL. Our value is similar to those of Göker et al. who included 1,900 patients residing in Manisa and Çıtıl et al. who measured Hb levels in 311 women in Tokat (11.9±1.3 g/dL, 11.9±1.2 g/dL).[16,17]

There is a limited number of studies that analyzed the relationship between anemia and age groups in pregnant women such as our study. In a study from Izmir, Taner et al. determined rate of anemia as 41.6%.[18] The authors listed maternal age over 35 years as a risk factor for anemia. In the study conducted by Öztürk et al. in Ankara, the prevalence of anemia among pregnant women over the age of 35 years was 19%.[19] In our study, the prevalence of anemia in AMA pregnancies was 21.53% and in entire pregnant population was 21.95%. Our results were in parallel with the results of Öztürk et al. Kavak et al. investigated adolescent pregnancies in Elazig and determined the anemia frequency as 18.2%.[20] On the other hand, the prevalence of anemia in adolescent pregnancies was 28.38% which was significantly higher than the other age groups in our study ($p<0.001$).

Anemia during pregnancy has been associated with a poor obstetric outcome.[6] Yıldız et al. studied 28,600 term births and investigated women who had suffered anemia during pregnancy and their respective outcomes.[21] The researchers found that infants born from mothers with anemia during pregnancy had reduced birth weight and shorter length at birth. We designed a prevalence study which did not search any pregnancy outcomes. This design characteristic was one of the limitations of our study. Another limitation of our study was the high difference between the number of patients in each group.

CONCLUSION

Although the prevalence of anemia during pregnancy varies according to many factors, it is still quite common all over the world. For this reason, each clinic should first evaluate its prevalence and then determine the risk factors. It should be taken into account that age is one the most important risk factors. Nutritional supplements should be provided, especially to the adolescent age group.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mehmet Ferdi Kıncı, Ezgi Karakaş Paskal, Ahmet Akın Sivaslıoğlu;* ***Design:*** *Ezgi Karakaş Paskal, Ercan Saruhan;* ***ontrol/Supervision:*** *Ahmet Akın Sivaslıoğlu;* ***Data Collection and/or Processing:*** *Ercan Saruhan, Mehmet Ferdi Kıncı;* ***Analysis and/or Interpretation:****Ercan Saruhan, Mehmet Ferdi Kıncı;* ***Literature Review:*** *Ezgi Karakaş Paskal, Mehmet Ferdi Kıncı;* ***Writing the Article:*** *Mehmet Ferdi Kıncı, Ercan Saruhan;* ***Critical Review:*** *Ahmet Akın Sivaslıoğlu;* ***References and Fundings:*** *Mehmet Ferdi Kıncı, Ezgi Karakaş Paskal;* ***Materials:*** *Ercan Saruhan.*

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