
OBSTETRICS

Prevalence and causes of anemia in pregnant women attending antenatal clinic at Thammasat Hospital

Atiwut Kamudhamas MD.

Faculty of Medicine, Thammasat University, Pathumthani 12120, Thailand

ABSTRACT

Objective To assess prevalence and causes of anemia in pregnant women at Thammasat Hospital.

Design Cross – sectional study.

Setting Antenatal clinic at Thammasat Hospital, Faculty of Medicine, Thammasat University.

Subjects The study group was 2,500 pregnant women who attended antenatal clinic.

Results The study showed that 2,500 pregnant women at Thammasat Hospital had anemia 12.5 percent with a mean hemoglobin of 9.34 ± 0.76 gram – percent and a mean hematocrit of 28.20 ± 2.33 volume – percent. Causes of anemia were Thalassemia and hemoglobinopathies 51.0 percent, iron deficiency anemia 43.6 percent, megaloblastic anemia 2.2 percent and aplastic anemia 0.3 percent. In groups of Thalassemia and hemoglobinopathies, it had been identified heterozygous hemoglobin E, homozygous hemoglobin E, hemoglobin H disease, β - Thal / Hb E disease, β - Thal disease, β - Thal trait, and α -Thal trait in 48.4, 34.0, 5.7, 4.4, 4.4, 2.5, and 0.1 percent respectively.

Conclusion Anemia is a medical condition with high prevalence rate. Major causes are Thalassemia , hemoglobinopathies , and iron deficiency anemia. It should be concerned by physician regarding a search for cause and a proper treatment.

Key words : prevalence, anemia, causes

Anemia is one of common public health problems in Thailand which can affect both general and pregnant population. There are many effects of anemia to pregnant women such as easy fatigability ,premature labour pain , less tolerance to blood loss during delivery. Moreover , anemia is also harmful to the fetus such as retarding intrauterine fetal growth, and causes a low birthweight infant.⁽¹⁻⁴⁾ There are abundance of reports about anemia and its prevalence but not in Thammasat Hospital and Pathumthani suburb. Therefore,studying the prevalence and causes

of anemia in pregnant women in local area would benefit in managing them, teaching medical students, preparing a hospital's policy and reporting for public resources.

Materials and Methods

Blood test for antenatal surveillance were taken from all first visited 2,500 pregnant women at antenatal care clinic of Thammasat Hospital between June, 1996 and June, 1997. The exclusion criteria were pregnant women who previously attended other

antenatal care clinics for this pregnancy, who were taking ferrous elements, or who previously received blood transfusion in three months. All data in this study were prospectively collected. Pregnant women with hemoglobin level below 11 gram-percent in first and third trimester of pregnancy and below 10.5 gram-percent in second trimester of pregnancy would be determined as anemia. Then repeated blood test for evaluation of the causes of anemia, that are, red blood cell morphology, red blood cell indices (mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration), hemoglobin typing, reticulocyte count, serum iron level, serum ferritin, and total iron binding capacity were done. Bone marrow study, special stained blood smear, globin gene analysis and other specific investigations were performed in selected cases depending upon consulting internists. These cases were also followed by blood tests to assess therapeutic regimens. Criteria for diagnosis of causes of anemia were shown in appendix. Results of this study were analyzed and showed in number and percentage.

Results

The ages of 2,500 pregnant women ranged from 15 to 41 years with a mean age of 25 years. Eighty percent of them were employees, mostly in the factories nearby, 11.7 percent were merchants, 5.8 percent were farmers and only 2.5 percent were civil servants. About an inhabited region, 44.2 percent were from central region, 35.8 percent were from northeastern region, and 12.5, 2.8, 2.5, 2.2 percent were from northern, western, eastern and southern region of Thailand respectively.

The prevalence of anemia in study group was 12.5 percent (312 in 2,500) with a mean hemoglobin of 9.34 ± 0.76 gram-percent as shown in Table 1 and a mean hematocrit of 28.20 ± 2.33 volume-percent.

About causes of anemia, 51.0 percent of the anemic group were Thalassemia and hemoglobinopathies, and 43.6 percent were iron deficiency anemia as shown in Table 2. In groups of Thalassemia and hemoglobinopathies, heterozygous hemoglobin E and homozygous hemoglobin E were found as much as 48.4 and 34.0 percent respectively, the rest of them were hemoglobin H disease, β -Thal/Hb E disease, β -Thal disease, β -Thal trait, and α -Thal trait as shown in Table 3. Megaloblastic anemia was found 2.2 percent and aplastic anemia was found one case or 0.3 percent. There were 9 cases that diagnosis could not be made, because they lost of following up before definite diagnosis had been achieved. Four of the non-diagnostic group had mild anemia, mild hypochromic microcytic red blood cells, normal hemoglobin pattern (A A), normal TIBC, and not decreased serum iron (3 of 4 = normal, 1 of 4 = slightly increased), these 4 cases were considered to have α -Thal trait but lost of following up before globin gene analysis was encountered. The rest five of the non-diagnostic group lost of following up as soon as diagnosis of anemia had been made. Mean hemoglobin and standard deviation, mean hematocrit and standard deviation of each etiology were also reported in Table 4.

Discussion

Most of pregnant women in this study were young female adults between 20 to 24 years of age, with a total mean age of 25 years (± 2.5). Most of them worked as employees and plenty of them moved from other regions especially from the northeast and the north. The prevalence of anemia in pregnancy in this study is high (12.5 percent). There are wide ranges of prevalence from other reports as shown in Table 5.

Table 1. Hemoglobin levels of the anemic groups

Hemoglobin (gram-percent)	1 st trimester	2 nd trimester	3 rd trimester	All trimesters	
	No	No	No	No	Percent
≥10.0*	22	135	4	161	51.6
9.0-9.9	16	75	5	96	30.8
8.0-8.9	4	20	2	26	8.3
7.0-7.9	4	7	3	14	4.5
6.0-6.9	2	4	2	8	2.6
5.0-5.9	3	3	0	6	1.9
≤4.9	0	1	0	1	0.3
Total	51	245	16	312	100
Mean Hb±S.D.	-			9.34±0.76	

* 10.0 meant 10.0-10.9 in 1st and 3rd trimester, and 10.0-10.4 in 2nd trimester

Table 2. Etiology of anemia

Etiology of anemia	No	Percent
Thalassemia and hemoglobinopathies	159	51.0
Iron deficiency anemia	136	43.6
Megaloblastic anemia	7	2.2
Aplastic anemia	1	0.3
Unknown cause	9	2.9
Total	312	100

Table 3. Detailed etiology in groups of Thalassemia and hemoglobinopathies

Etiology	No	Percent
Heterozygous hemoglobin E	77	48.4
Homozygous hemoglobin E	54	34.0
Hemoglobin H disease	9	5.7
β - Thal /Hb E disease	7	4.4
β - Thal disease	7	4.4
β - Thal trait	4	2.5
α - Thal trait	1	0.6
Total	159	100

Table 4. Mean hemoglobin and mean hematocrit of each anemic etiology

Etiology of anemia	Mean hemoglobin (gram-percent \pmS.D.)	Mean hematocrit (volume-percent\pmS.D.)
Thalassemia and hemoglobinopathies		
- heterozygous hemoglobin E	10.40 \pm 0.14	31.15 \pm 0.44
- homozygous hemoglobin E	9.48 \pm 0.25	28.42 \pm 0.78
- hemoglobin H disease	7.92 \pm 0.64	23.75 \pm 1.95
- β - Thal /Hb E disease	6.16 \pm 0.23	18.54 \pm 0.60
- β - Thal disease	6.44 \pm 0.25	18.33 \pm 0.77
- β - Thal trait	10.33 \pm 0.13	31.04 \pm 0.32
- α - Thal trait	10.42 \pm 0.00	31.12 \pm 0.00
Iron deficiency anemia	9.20 \pm 1.17	27.62 \pm 3.50
Megaloblastic anemia	10.10 \pm 0.47	30.34 \pm 1.42
Aplastic anemia	4.60 \pm 0.00	13.00 \pm 0.00
Total mean \pm S.D.	9.34 \pm 0.76	28.20 \pm 2.33

Table 5. Prevalence of anemia in pregnancy from other studies

Anthors	Locations	Years	Prevalence (Percentage)	Diagnostic Criteria
Koranantakul O ⁽⁵⁾	Songkla hospital , Thailand	1984	26.4 7.3	Hb < 11 gram-percent Hb < 10 gram-percent
Ministry of Public Health	All region , Thailand	1989	21.57	Hb < 10.5 gram-percent
Kummalue T ⁽⁶⁾	Maharat hospital , Thailand	1994	20.5	Hb < 11 gram-percent
Hongwinitkul M ⁽⁷⁾	Udonthani hospital,Thailand	1994	29.1	Hb < 10 gram-percent
Mahfouz A ⁽⁸⁾	Saudi Arabia	1994	31.9	Hb < 11 gram-percent
Ogbeide O ⁽⁹⁾	Nigeria	1994	20.7	Hb < 10 gram-percent
Hossain MM ⁽¹⁰⁾	United Arab Emirates	1995	14	Hb < 11 gram-percent

The variation of prevalence among all of these studies may be explained by two reasons. The first reason is demographic difference⁽¹¹⁾, the other is difference in diagnostic criteria. Some preliminary studies (shown in Table 5) diagnosed anemia when Hb level below 11 gram-percent, some studies used Hb level of 10.5 gram-percent, some studies used 10 gram-percent. This study used diagnostic criteria which was recommended by Center for Disease Control (U.S.A.) that established anemia when Hb level below 11, 10.5, 11 in first, second and third trimester respectively, due purposefully to getting rid of physiologic anemia in second trimester⁽⁴⁾. Whatever criteria, prevalence of anemia in pregnancy is generally high.

However, when detailed result was analyzed, prevalence of anemia in this study is lower than other studies and anemia from Thalassemia and hemoglobinopathies are becoming more prominent. These findings may be explained that distribution of population in this area is not natural, most of people living in this area are not inhabited, but are migratory people that working as an employee in the factories nearby. Plenty of them moved from the northeast and the north regions where Thalassemia and hemoglobinopathies are endemic. Another hypothesis is the must to see whether prevalence of iron deficiency anemia is possibly decreasing or not, further study is suggested.

In consideration within groups of Thalassemia and hemoglobinopathies, Hb E is the most prevalent (Table 3 and 4), β -Thal is found 11.3 percent consisted of β -Thal/Hb E disease, β -Thal disease, and β -Thal trait, α -Thal is found 6.3 percent consisted of Hb H disease and α -Thal trait, it is discussed that this prevalent ratio cannot be instead for the whole population because some of β -Thal trait, some of α -Thal trait, and most of α -Thal silent carrier ($-\alpha/\alpha\alpha$) do not cause anemia, therefore this study must inevitably lack to report some amount of these cases because objective is to find just in case of anemia in pregnant women.

However, it is suggested that hemoglobin level from routine antenatal screening laboratory tests must

be considered by all physicians even though its level is slightly reduced, because mild form of Thalassemia and hemoglobinopathies are highly prevalent and can be hidden in such those mild anemic cases. If even a carrier status is detected, paternal hemoglobin typing should be done to see fetal risk for major Thalassemia that may lead to definite prenatal diagnostic procedure.

Finally, one point of concern established from this study is rather late first antenatal attention of pregnant women (Table 1), further study is recommended in more pregnant population background to see its nature and probably its reason, because it may help this suburb population improving their health in social theme.

In conclusion, anemia is a high prevalent medical condition complicating pregnancy. Thalassemia and hemoglobinopathies are becoming a majority of cause, its effects are not only from anemic condition, but also from genetic inheritance. Counselling for prenatal diagnosis is essential. Iron deficiency anemia is still highly prevalent as generally known. Therefore, physicians should concern in screening all pregnant women for detection of anemia, searching for causes, and giving proper management.

Appendix

Criteria for diagnosis^(4,12,13): Aplastic anemia: pancytopenia on peripheral blood smear, reduction of corrected reticulocyte count (<1%), and hypocellular bone marrow (<25%) Megaloblastic anemia: normochromic macrocytic red blood cells and hypersegmented neutrophils on peripheral blood smear, RBC indices found MCV > 100 fl, MCHC normal, and increased MCH, bone marrow study found hypercellularity with erythroid and granulocytic hyperplasia. Iron deficiency anemia: hypochromic microcytic red blood cells on peripheral blood smear, RBC indices found MCV < 75 fl, and decreased MCHC, iron study found decreased serum iron, increased TIBC, and decreased serum ferritin, and therapeutic test was evaluated.

Thalassemia and hemoglobinopathies: hypochromic microcytic red blood cells with poikilocytosis on peripheral blood smear, decreased MCV, MCH, and MCHC, normal to slightly increased serum iron and serum ferritin level, normal to slightly decreased TIBC, Hb typing by electrophoresis shown for detection of hemoglobinopathies, β -Thal, and Hb H disease, and globin gene analysis was done for detection of α -Thal trait.

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