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CLINICO-HEMATOLOGICAL EVALUATION OF ANEMIA IN PREGNANT WOMEN

Pathology

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ABSTRACT

Background- According to the WHO, the prevalence of anaemia in pregnant women in developed countries is 14%; in developing countries, it is 51%; and in India, it varies from 65% to 75%. **Aims-** To study the complete clinico-haematological profile of pregnant anaemic women in different trimester, analyse the characteristics of various types of anaemia, predict the role of Mentzer index for differentiating iron deficiency anemia and to screen for cases of thalassemia in eastern Uttar Pradesh. **Methods:** This was a prospective observational study conducted on 200 pregnant anaemic women. Blood samples were taken in an EDTA vial for a complete blood count, screening for thalassemia, and peripheral blood smears were examined along with their complete clinical and obstetric history. **Results:** Out of 200 cases of anaemia, 44% of patients have normocytic normochromic anaemia and 31% have microcytic hypochromic anaemia. The sensitivity and specificity of Mentzer index for iron deficiency anemia in our study was 98.25% and 16.67%. The risk factors for anaemia noted in this study are low social and economic status, low occupational status, low educational status, and demographic status. In this study, anaemia was more commonly found in the third trimester of pregnancy. **Conclusions:** With improved social and economic conditions, early detection, good antenatal care, awareness regarding available treatment, a healthy diet, routine antenatal counselling, and adequate iron supplementation, anaemia in pregnancy can be avoided.

KEYWORDS

Anemia, Haemoglobin, Pregnancy, Thalassemia, Trimester.

INTRODUCTION

Anaemia is defined as a condition in which haemoglobin (Hb) level, red blood cell count and haematocrit value in the body is lower than normal, which brings about a diminished oxygen carrying capacity of red blood cells to tissue. It influences all age group, yet pregnant ladies and kids are more vulnerable.[1]

According to WHO criteria, Anaemia is defined as Hb < 11 gm/dl in the 1st and 3rd trimesters and Hb<10.5 gm/dl in the second trimesters. Mild, moderate, and severe anaemia were characterized by Hb in the range of 10.0-10.9 gm/dL, 7.0-9.9 gm/dL and under 7.0 gm/dL, respectively.[2]

As per center for Disease Control and Prevention, anemia is characterized as hemoglobin or hematocrit value less than fifth percentile of distribution of hemoglobin or hematocrit in a healthy reference population of pregnant women. [3]

Anemia is one of the most widely recognized nutritional deficiency disorders influencing the pregnant women; the prevalence in developed nations is 14%, in developing nations 51%, and in India, it differs from 65% to 75%.[4] The prevalence of anemia in pregnancy increases from 8% in the first trimester to 12% and 34% in the second and third trimester respectively. As many as 4 to 16% of maternal deaths are due to anemia, in India.[5]

Anemia is commonly considered as a risk factor for poor pregnancy outcomes and can result in complications that threaten the life of both mother and foetus, such as preterm birth, low birth weight, foetal impairment, maternal and foetal deaths, impaired neurodevelopment in offspring, intrauterine growth retardation, leading on to poor neonatal health and perinatal death, and reduced cognitive function and physical work capacity later in life.[6]

The aim of the present study is to study the complete clinico-haematological profile of pregnant women in different trimester presenting with anaemia, to correlate the mentzer index, socio-economic status and educational status with antenatal anemia, to know the causes of anaemia in different trimester and to screen the cases of thalassemia in pregnant women.

METHODS

Cases of antenatal anaemia were taken from Obstetrics and Gynaecology department of Sir Sunderlal Hospital, Banaras Hindu University, Varanasi. This study was a prospective observational study conducted from December 2020 to 2022.

Inclusion criteria:

- Singleton pregnancy with a complete medical record
- Hb < 11.0 g/dl
- Planned delivery at same hospital & willingness to participate in the study

Exclusion criteria:

- Women with history of antepartum haemorrhage.
- Patient with history of chemotherapy and radiotherapy exposure.
- Not willing to give consent

Complete clinical and obstetric history was recorded, Socio economic status, educational status, occupational status, demographic status, and routine diet was noted. Haematological indices including complete blood count, peripheral blood smear, Reticulocyte count, Total Iron Binding Capacity, Serum iron, Thyroid function test, Liver Function Test and Renal Function Test and for thalassemia screening High performance liquid chromatography was performed.

RESULT

Demographic characteristics of the study participants showed that the mean age of the pregnant women was 26.5 years, with a standard deviation of 3.96 years. Our youngest pregnant women was 18 years and oldest women was 38 years. 63%(n=126) of anemic pregnant women were in the third trimester while only 8%(n=17) were in the first trimester. 72%(n=144) of the pregnant women were literate while 28%(n=56) were illiterate with poor education on nutrition and dietary intake. 85% (n=170) of the anemic pregnant women were housewives while 15%(n=30) were working. According to Revised Modified BG Prasad socioeconomic classification scale, 2020 scale 61.5% (n=123) of the women belong to middle socio- economic status, 32.5% (n=65) of the women belong to low socio-economic status and 6%(n=12) of the women belong to high socio-economic status.

According to WHO criteria 66%(n=132) of pregnant women were moderately anemic followed by 18%(n=36) women were mildly anemic and 16%(n=32) were severely anemic. 44%(n=88) of the

pregnant women had normocytic-normochromic type of anemia, 20%(n=40) of the pregnant women had dimorphic anemia, 31%(n=62) of the pregnant women had microcytic hypochromic type of anemia while 5%(n=10) had macrocytic type of anemia. 57.0%(n=114) of the pregnant women were suffering from iron deficiency anemia, 3.5%(n=9) of the pregnant women were suffering from megaloblastic anemia, 15.5%(n=31) had physiological anemia of pregnancy and 3%(n=6) had thalassemic trait.

DISCUSSION

Ante partum anaemia is a very important issue that needs aggressive attention to treat. India contributes to 80% of maternal deaths caused by anaemia in South Asia.[5] The commonest cause of anemia in pregnancy according to WHO report is nutritional i.e. iron deficiency anemia. In our Study iron deficiency anemia was the most common type of anemia 57%(n=114), followed by megaloblastic anemia and thalassemia trait 4% (n=9) and 3%(n=6) respectively with low serum iron level in 65.7% of the pregnant women. Our study was comparable with the study of Gupta v et al[7] and Shukla J et al [8] in which iron deficiency anemia was the most common type of anemia in pregnant women.

The mean age of the pregnant women in various national and international studies varies from 24.8-27.8, 28.5-28.9 respectively. In our study maximum number of pregnant women were between the age group of 23-27 years. The mean gestational age of presentation in our study was 26.5 years with a standard deviation of 3.96 which was similar to the study done by Sarojamma C et al[9] , Nirmala C et.al [10], Gupta V & Sharma K et al [7] and Singh p, Chaudhary v et.al[11]. Youngest pregnant women in our study was 18 years and oldest was 38 years. The lower age group in our study could probably be due to early age of marriage in rural part, poor nutritional status, and lower income of the family in India.

In our Study maximum number of the pregnant women were in 3rd trimester which correlate with the study of Rasheed P et al[12] , Sarojamma C et.al[9], Ahmad A et al [14] and one international study conducted by Abusharib et al. [13]as the requirement of vitamins and minerals increases during late pregnancy, secondly this study was done in a teritary care hospital so, many cases are referred here from the nearby districts of eastern Uttar Pradesh.

In our Study 44% number of the pregnant women have normocytic normochromic as they are getting external iron and folic acid administration from the local ASHA and Anganwadi workers anemia followed by 31% of microcytic hypochromic anemia, 20% of dimorphic anemia and 5% of macrocytic anemia which is comparable with the study of Nirmala C et al [10]and Sarojamma C et al[9].

In our Study maximum number of anemic pregnant women belong to rural community 138 (69%) as compared to people from urban areas 62(31%) similar with the study of Gupta V et al[7], Pereira E et.al[15] and Zafar M et al[16].

The high prevalence of anemia in rural population is due to their food habits, hygiene, less awareness about nutritional requirement during pregnancy, lower literacy rates and limited access to health care system.

According to WHO 5% of adults are carriers for thalassemia and 3.9% were of Beta-thalassemia trait. In our study conducted in eastern Uttar Pradesh which is a thalassemia belt, 3%(n=6) of the pregnant women had thalassemia trait comparable with the observation made by Zafar M et al [16]and Mondal S study[17].

The sensitivity and specificity of Mentzer index for iron deficiency anemia in our study was 98.25% and 16.67% like the study of Zafar M et al[16] which shows that most of the cases had concomitant iron deficiency anemia along with beta thalassemia. In our study mean HbA2 level was 2.8 with a standard deviation of 1.34, similar to R S Balgair et al[18] study with a mean value of 3.5 and standard deviation of 0.4.

Acknowledgement:
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Conflict of interest: None

Table 1-Socio demographic distribution of anaemic pregnant women (n=200)

Age (years)	Frequency (n=200)	Percentage
18-22	30	15.0%
23-27	96	48.0%
28-32	56	28.0%
33-38	18	9.0%
Range of age =18-38, Mean=26.51, SD=3.96		
Trimester		
1st	17	8.5%
2nd	57	28.5%
3rd	126	63.0%
Education		
<high school	80	40.0%
>=high school	120	60.0%
Occupation		
House wife	170	85.0
Working	30	15.0
Socio-economic status		
Low	65	32.5%
Middle	87	43.5%
High	48	24.0%

Table 2: Distribution Of Pregnant Women According To Anaemia

Grade of anemia	Number of pregnant women(n=200)	%	P Value
Mild (10-11gm/dL)	36	18%	
Moderate (7-9.9gm/dL)	132	66%	
Severe (<7gm/dL)	32	16%	
Peripheral Blood Smear			
NCNC	88	44	0.393(Insignificant)
Dimorphic	40	20	
MCHC	62	31	
Macro	10	5	
CAUSES OF ANEMIA			
Iron deficiency anemia	114	57.0	
Dimorphic anemia	40	20	
Megaloblastic anemia	9	4.5	
Physiological anemia in pregnancy	31	15.5	
Thalassemia trait	6	3	

Table 3: Association Of Anaemia With Socio-demographic Factors

Age(Years)	Haemoglobin(N=200)			Total	P Value
	Mild (10-11)	Moderate (7-10)	Severe (<7)		
18-22	3 (10%)	18 (13.6%)	9 (28.1%)	30 (15%)	0.080 (Insignificant)
23-27	21(58.3%)	62 (47%)	13 (40.6%)	96 (48%)	
28-32	11 (30.6%)	40 (30.3%)	5 (15.6%)	56(28%)	
33-38	1 (2.8%)	12 (9.1%)	5 (15.6%)	18 (9%)	
Total	36 (100%)	132 (100%)	32 (100%)	200 (100%)	
Education					
<high school	11(30.6%)	51 (38.6%)	18 (56.3%)	80 (40%)	<0.084(Insignificant)
>=high school	25 (69.4%)	81 (61.4%)	14 (43.8%)	120 (60%)	
Total	36(100%)	132 (100%)	32 (100%)	200 (100%)	
Occupation					
House Wife	31 (86.1%)	112 (84.8%)	24 (85.7%)	170 (85%)	0.997 (Insignificant)
Working	5 (13.9%)	20 (15.2%)	4 (14.3%)	30 (15%)	
Total	36 (100%)	132 (100%)	28 (100%)	200 (100%)	
Socio-economic status					
High	10 (27.8%)	32 (24.2%)	6 (18.8%)	12 (6%)	0.122 (Insignificant)

Middle	20 (55.6%)	56 (42.4%)	11 (34.4%)	123 (61.5%)
Low	6 (16.7%)	44 (33.3%)	15 (46.9%)	65 (32.5%)
Total	36 (100%)	132 (100%)	32 (100%)	200 (100%)

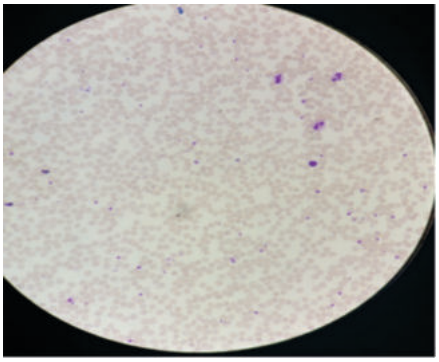

Fig-1: 40x view of Dimorphic anaemia

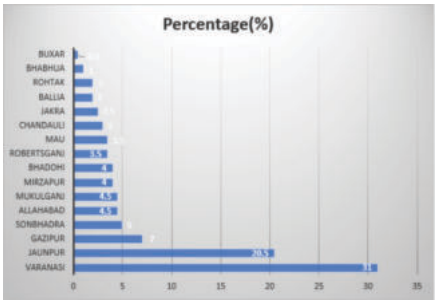

Fig-2: Area wise distribution of anemic pregnant women

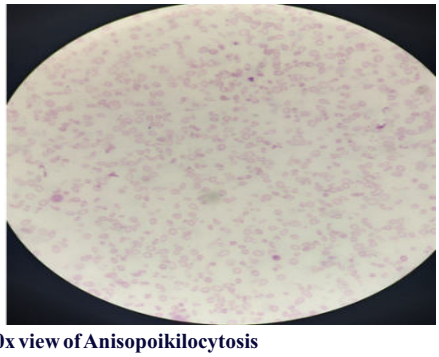

Fig-3: 40x view of Anisopoikilocytosis

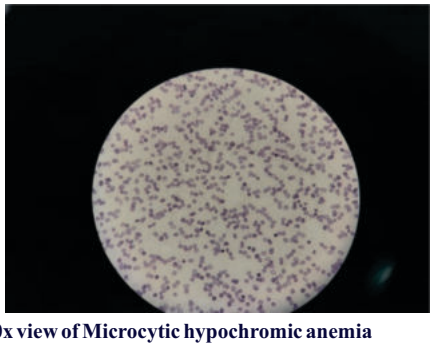

Fig-4: 40x view of Microcytic hypochromic anemia

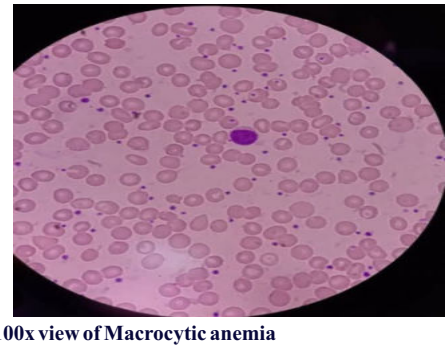

Fig-5: 100x view of Macrocytic anemia

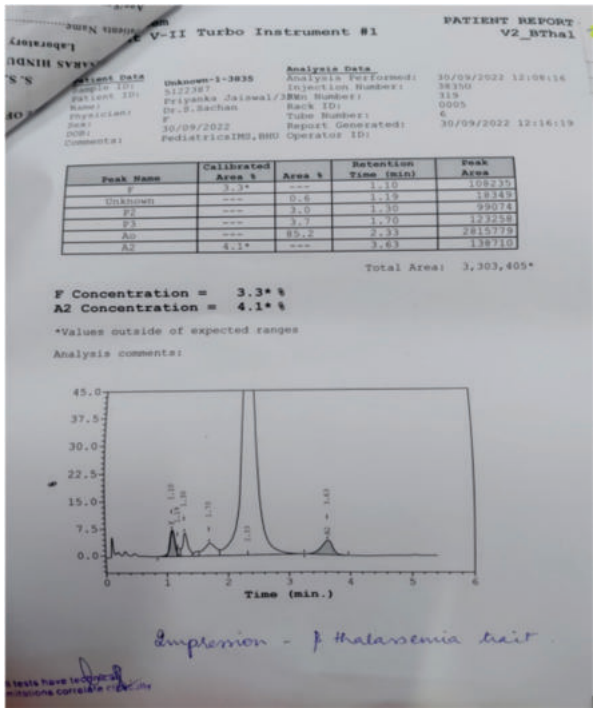

Fig-6: HPLC report of thalassemic patient

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