Red cell parameters in third trimester of pregnancy in a tertiary care hospital of Peshawar, Pakistan.

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Objectives: To study the red cell indices and hemoglobin (Hb) variation in third trimester of pregnancy and to compare the indicator for their significance in labeling a cell as hypochromic or microcytic.

Methodology: This cross sectional study was conducted in the department of Gynecology and obstetrics, Postgraduate Medical Institute, Lady reading Hospital (PGMI-LRH) Peshawar, Pakistan from August 1, 2012 to December 10, 2012 and included 152 women in their third trimester attending the center. Data were collected using a questionnaire.

Results: The age range was from 20 to 49 years (mean 33±3.4 years). 27(18%) were primigravida. 81(53%) had Hb less than 11g/dl and 22% had HCT<32%, which as per criteria of the WHO were anemic. 29(19%) patients had low MCV (microcytic). RDW was the best indicator for deciding the microcytic nature of the cell than MCV. There were 29 (19%) women with MCV<80Fl while there were 55(36%) ladies with RDW-CV%>15. Mean Corpuscular Hemoglobin (MCH) was <27pg in 26(17%) patients while Mean Corpuscular HB Concentration (MCHC) was less than 31g/dl in 44(29%) women.

Conclusion: The anemic ratio of the pregnant women, especially in third trimester of pregnancy was significant. Hb% is simple and easy way to detect anemia, but the importance of the HCT values is also intact. MCH and MCHC showed decrease in significant population. We observed a significant increase in the RDW-CV% value, which is more specific than MCV to label patient having microcytic anemia. HB% is more specific than HCT, MCHC>MCH and RDW-CV%>MCV. (Rawal Med J 2014;39:435-438).

Keywords: Anemia in pregnancy, Red cell indices, microcytosis, hypochromia.

INTRODUCTION

Anemia in pregnancy is defined as hemoglobin (Hb) concentration of less than 10g/dl. Anemia in pregnancy is a major public health issue. WHO estimates half of the pregnant women in the world have Hb level indicative of anemia (<11g/dl) and its prevalence is 56-61% in the developing world. The most common cause of anemia in pregnancy is iron deficiency.[1] In pregnancy the increased blood supply includes a 45-50% increase in plasma volume and 20- 30% increase in red blood cells. In majority of cases, the anemia is due to decreased amount of nutrient(s) needed for hemoglobin synthesis.[2]

The hematological profile of the pregnant woman has an impact on the outcome of the pregnancy. 56% of pregnant women in low income countries suffer from anemia, in contrast to 18% in high-income countries.[3] There is an increased risk of preterm birth. More severe cases of anemia (Hb <8 g/dL) are associated with greater risks of preterm birth and low birth weight. A study from Hyderabad reported the prevalence of anemia in these subjects was 90.5%; of these, 75.0% had mild anemia (hemoglobin from 9.0 to 10.9 g/dL) and 14.8% had moderate anemia (hemoglobin from 7.0 to 8.9 g/dL).[4]

Normal reference range in human red blood cells for RDW-CV is 1115%. If anemia is observed, RDW test results are often used together with MCV to determine the possible causes of the anemia. It is mainly used to differentiate an anemia of mixed causes from an anemia of a single cause. RDW is the best indicator for anisocytosis in pheriphral smear and indicating the microcytic nature of RBC.[5] MCHC was found to have highly significant inverse correlation with the weeks of pregnancy (respectively -.278 P < .0001 and .342 P < .00001) in

205 pregnant women.[6] We determined the values of six important RBC parameters: Hematocrit (Hct), Hemoglobin concentration (Hbc), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) in healthy pregnant subjects receiving antenatal care in our institution.

METHODOLOGY
This cross sectional study was conducted in the department of Gynecology and obstetrics, Postgraduate Medical Institute, Lady reading Hospital (PGMI-LRH), Peshawar, Pakistan from August 1, 2012 to Dec 10, 2012. Through convenient non-probability sampling, a total of 152 women in their third trimester were included. All post-natal patients or patients with other gynecological disorders (like patients with tumors of the female genital tracts, fibroids or other associated disorders, women in their first and second trimester and patient taking regular iron pills

were excluded from the study. Proper in written permission from the Chief executive of the LRI-PMI and verbal consent from patients were taken. Complete blood count was calculated on hematology analyzer. Anemia was labeled when Hb level of <11 g/dl, in accordance with the definition of WHO. Anemia was further categorized as mild, moderate and severe.[4] Preliminary information of the women regarding, age, gravid, para, address, weight and socioeconomic status was recorded. The data was analyzed using MS-Excel program.

RESULTS
The study included 152 women in their third trimester. The age range was from 20 to 49 years (mean 33±3.4 years). HB% was more specific than HCT, MCHC>MCH and RDW-CV%>MCV. 81(53%) of the females were having hemoglobin less than 11g/dl and 22% of the women had HCT<32% which as per criteria of the WHO were anemic (Table 1).

Table 1. Hemoglobin versus hematocrit analysis to study the nature of hypochromic anemia and scale it on the WHO definition for anemia(HB<11g/dl) and HCT<30%)

HB (g/dl)	HCT (%)								Grand Total
	17-22	22-27	27-32	32-37	37-42	42-47	47-52	87-92	
4-5								1	1
5-6	3								3
6-7		1							1
7-8		2							2
8-9		5	7	1					13
9-10			10	1					11
10-11			9	36	5				50
>11				16	39	12	1	3	71
Grand Total	3	8	26	54	44	12	1	4	152

RDW-CV% value was more specific than MCV indicator to label patient having microcytic anemia. There were 29 (19%) women with MCV <80FL

while there were 55(36%) pregnant ladies with RDW-CV%>15 (Table 2).

Table 2. Parameters for microcytic nature of RBC in anemia (which is best indicator RDW-CV vs MCV).

MCV(fl)	Red cell distribution width coefficient variant (CV%)													Grand Total	
	11	12	13	14	15	16	17	18	19	20	25	28	-		
28-38		1	1	1										3	
48-58								1						1	
58-68				1	3		1	4	1	1		1	1	13	
68-78			1	1	2	1	3	1	2	1				12	29
78-88	3	1	18	13	9	3		1	1	1	1			51	
88-98	1	13	19	19	9	2	1	1						65	
98-108			3	1	1	2								7	
Grand Total	4	15	42	36	24	8	5	8	4	3	1	1	1	152	
							55								

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Table 2. Parameters for microcytic nature of RBC in anemia (which is best indicator RDW-CV vs MCV).

MCH (pg)	MCHC (g/dl)					Grand Total
	22-27	27-32	32-37	37-42	42-47	
16-21	2	7	2			11
21-26	2	7	6			15
26-31		27	67		1	95
31-36		6	22	2		30
36-41			1			1
Grand Total	4	47	98	2	1	152

DISCUSSION

In our study, 33% were in the age range of 30-34 years of age. Maternal age at conception has long been demonstrated to have a significant correlation with pregnancy outcome and maternal health. Classically, very young (<20 years old) and old (= or >35 years) women have been classified as high-risk categories for child bearing.[6] Forty one (27%) females were in Gravida 3 status and 27(18%) were in G1 and G2. The grand multipara may be at higher risk of postpartum hemorrhage. Anemia was more related with multi gravidity.[7,8]

In our study, 81(53%) had Hb less than 11g/dl, though they were asymptomatic. 71(46.7%) had Hb>11g/dl. Other investigators have reported similar findings.[3] A study from Karachi also reported that 1557 (91%) pregnant women had some degree of anemia and the number of women whad moderate to severe anemia (Hb 8-9.9 and <8, respectively).[2] Another study from Islamabad reported that 55% had mild anemia with Hb <11g/dl.[9]

We found that 22% of the women had HCT<32%. The World Health Organization has suggested that where up-to-date information is not available, prevalence studies should be undertaken.[1,2] We also found that 29(19%) patients had low value of MCV (microcytic). Fifty five patients (36.2%) had RDW CV (%) more than 15% which points more towards the microcytic nature of anemia and more anisocytosis. This point is of great interest that RDW values 36% versus MCV 19%. RDW helps in early detection of the iron deficiency and can detect even very small change in the size of the RBC prior than noted on MCV findings. A high RDW values more significant in diagnosis of microcytic nature of the RBC. It had sensitivity 82.3% and specificity 97.4%, whereas MCV, MCH and MCHC had 29.2%, 68.1% and 15% sensitivity but specificity was 98.7%, 83.1% and 96.1% in the detection of iron deficiency.[10] There is significant rise in the values of the RDW in the third trimester of pregnancy. These changes are significant than other RBC indicator. The unexpected rise in the RDW

during the last 4-6 weeks leading up to the onset of labor suggests increased bone marrow activity.[11] RDW changes are highly significant there may well be a useful indicator of impending parturition.

CONCLUSION

We conclude that RDW is the best indicator for prediction of iron deficiency anemia in pregnancy. RDW must be correlated with other RBC indices to make the findings more reliable and confirmatory. RBC indices are best indicators for knowing type of anemia. High RDW, low MCV, low MCHC and MCH are best indicator for iron deficiency anemia in pregnancy.

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