

# Determinants and levels of complete blood count report in finding type of anemia in Rural population of Pakistan

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## ABSTRACT

**Aim:** To assess the determinants and levels of complete blood count report (Rbc count, Hb, RDW-CV, MCV AND OTHER HB INDICES), to find the type of anemia in rural population of DINA NATH (Pak Red Crescent Medical & Dental College) in the period w.e.f. January to May 2020.

**Methods:** Using of complete blood count report, MCV, red cell distribution width RDW –CV.

**Results:** In 242 patients attending in OPD with certain complaints but not with any known cause of anemia 42 patients were found anemic).

**Conclusions:** out of 42 patients selected for complete blood count report the iron deficiency anemia was found in 70 percent patients in all groups while mixed nutrient deficiency & anemia of chronic disease was found 22% and 8% patients respectively.

**Keywords:** Anemia, CBC, rural population

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## INTRODUCTION

Anemia is prevalent in one third of population of world <sup>1</sup> and half of the population is iron deficient. it is present in about 50% of females in reproductive (pregnant or non-pregnant) age group <sup>2</sup>. Anemia is a late indicator of iron deficiency so iron deficiency is 2.5 times the iron deficiency anemia. The estimated prevalence in developing countries is 39% in children < 5 years, 48% in children 5-14 years, and 42% in women 15-59 years, 30 % in men in 15 – 59 years<sup>3</sup>. Anemia is a major health problem as it causes preterm labour in women, infant mortality<sup>4</sup>, poor motor & sensory development in children<sup>5</sup>.

The anemias may be due to decreased micronutrients (decreased oral intake absorption & metabolic defects) hemoglobinopathies, anemia of chronic disease (inflammation as with TB, rheumatoid arthritis, renal failure)<sup>4,5</sup>, infestations as with hook worm infestations schistosomiasis, malaria, or other disorders, haemorrhages (bleeding ulcers, polyps, inflammatory bowel disorders, haemorrhoids or gut malignancies, bleeding or coagulation disorders (thrombocytopenia, platelet disorders, coagulation disorders deficiencies, DIC, TTP or HUS) aplastic anemias, or infiltrative disorders as Leukemia, lymphomas or myelodysplasia. Many a times it is difficult to find the type and cause of anemias so we employ a simple test (complete blood count, rbc count, MCV, in combination with and RDS –CV values with its levels and determinants)<sup>6</sup> before investigating with expensive tests to determine the cause of anemias and to treat it and then a relatively brief scheme of investigations are to be followed to reach the final diagnosis in difficult cases.

## MATERIALS & METHODS

Selection of Patients 42 patients out of total 242 males, females and children attending the outpatient door of

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department of medicine in Pak Red Crescent Medical & dental college Dina Nath with certain complaints were evaluated as per following. The patients, presenting complaints with proper history and physical examination showing features of anemia were noted and those with, worm infestations (on stool examination) haemoglobinopathies, bleeding ulcers, piles chronic liver diseases,, and malignancies were not included in the study. The patients were examined & found to be anemic were included in study group. The patients general physical and systemic examination, performed & and any abnormality detected were noted.

**Methods:** The patients blood is collected in the vials with anticoagulants and examined in automatic analyser in laboratory of Pak Red crescent & Medical college & teaching hospital. Correlation of RBC count, platelet count, MCV, RDW C-V helps in detecting early nutritional deficiency anemias as iron, folate, vitamin B12 deficiency & hemolytic anemia. RDW-CV which is elevated in nutritional deficiency anemias remains within normal limits in anemias of chronic diseases as renal failure & chronic inflammatory diseases. It also helps in differentiating iron deficiency anemia (RDW high, normal or low MCV) from uncomplicated thalassemia (normal RDW, LOW MCV), distinguishes between megaloblastic anemia as folate or vitamin B12 deficiency (elevated RDW) and other causes of macrocytosis (often normal RDW). It also helps in necessitating the importance of further investigation of blood samples as elevated RDW may indicate red cell fragmentation agglutination or dimorphic red cell populations. RDW along with MCV helps in narrowing the cause of anemia<sup>6,7, 8,9,10,11,12</sup>.

## RESULTS

Determinants & levels complete bood count & RDW C-V  
<sup>1</sup>Rbc. red blood cell.<sup>2</sup>rdw c-v. red cell distribution width coefficient variable.<sup>3</sup> Anemia of chronic disease. Mentzer

index is calculated by formula MCV fl/RBC count millions/microliter.

So in above table 29 patients with lower red blood cell count and 13 patients with normal red blood cell counts were noted. However all the patients except one macrocytic and nine normocytic with decreased rbc s number were noted. So by using different parameters we deduced different diagnosis

Mentzer index is more than 13 in all cases individually, so all the cases are found to be suffering from iron deficiency anemia & no case is of beta thalassemia.

ACD<sup>1</sup> –anemia of chronic disease M. male.C m. male child, C f female child.Mentzer index is calculated by formula MCV 1L/RBC count millions /microliter helps in differentiating iron deficiency anemia from beta thalassaemia<sup>14</sup> is helpful in all cases with normal rdw cv. if it is less than 13 beta thalassemia is suspected. In our study no such case was detected.

So out of total 42 patients, 29 females, 6 males, 7 children were randomized. majority of patients collectively 39 showed high RDW C-V and 35 out of 42 showed lower MCV.

Table 1: Low Hb / Low Hct The patients with low hemoglobin & hematocrit along with their RDW C-V & Mean corpuscular volumes

Group no	RDW-CV N11.5%-14.5% >N <N N	Normocytic Mcv 80-95fl	Microcytic/ macro Mcv<80fl Mcv>95
Female 29	27 0 02	05	23 01
Male 06	05 0 01	01	05 -
Paed M 05	05 - -	-	05 -
Paed F 02	02 - -	-	02 -

Table 2 Correlation of rbc no, rdw cv and cell size with possible etiological factors

rbc no <sup>1</sup>	MCV	Rdw cv <sup>2</sup>	Cell size	Cause
Decreased 1	Increased	Increased	Macrocytic	Acute Hemorrhage
Decreased 7	Normal	Increased	Normocytic	Mixed deficiency of Fe & folic acid
Decreased 2	Decreased	Increased	Normocytic	ACD <sup>3</sup> /beta thalassemia
Decreased 19	Decreased	Increased	Microcytic	Iron deficiency
Normal 13	Decreased	increased	Microcytic	Iron deficiency/ beta thalassemia

Table 3: Correlation of normal rbc no, rdw cv and cell size & possible causes. Mentzer index is calculated by formula MCV in fl/RBC in millions per microliter

rbc no normal	MCV	Rds cv	Cell size	
2	Normal	Increased	Normo	Mixed deficiency iron &folic acid
1	Decreased	Increased	Micro	Iron deficiency
10	Decreased	Increased	Micro	Iron deficiency

Table 4: combined 2 & 3

NO	MCV	RDW SD	RDW CV	CELL SIZE	
03 (M2,C <sub>m</sub> 1) 06 F	Normal 01 Normal 08	Normal 1 normal 8	increase 1 Increase 8	Norm 1 Norm 8	Mixed deficiency iron &folic acid
03(M2, F 1) 29	Decrease 03 Decrease 29	Decrease 3 Decrease 29	Normal 3 Increase 29	Micro 3 Micro 29	ACD <sup>1</sup> , beta thalassemia Iron deficiency, beta thalassemia
01	Increase 01	Increase 01	Increase 01	Macro 01	Acute hemorrhage.

Diagnosis of type of anemia

anemia of chronic disease	M F C <sub>m</sub> 1, <sup>2</sup> 02 01 0 0	Total 03	Percentage 7%
Mixed deficiency iron &folic acid	02 06 01 0	09	21%
Iron deficiency	03 19 05 01	29	69%
Acute hemorrhage	0 01 0 0	01	3%
beta thalassemia	0 0 0 0	0	0

1 male children. 2 female children.

As is deduced from above table 69% are iron deficient, 21% mixed nutrient deficient of folic acid, vit B12 & iron, while 7% of anemia of chronic disease As has been found that 242 males females & children who presented with pallor & without any known causes of anemia forty two male females & children were selected as it has been found in the above data collection that out of forty two randomly selected patients anemia is more prevalent in females & children. the type of anemia found is iron deficiency anemia ie 19/27 (70%) in female patients while 6/27 (22%) were found to be of mixed nutritional deficiency. the females were mainly in reproductive age groups. nearly same is the case with children in whom 5/7 (70%) male

children were found iron deficient while one male 1/7 (14%) out of seven was of mixed deficiency group.in males anemia was less prevalent seven patients with anemia were deducted, out of whom 3/7 i.e., 42% were iron 2 ie29 % of mixed nutrient & 2 i.e., 29% were found to be suffering from anemia of chronic disease.

It is observed that is 70 percent of total female anemic patients are iron deficient while 22 percent are mixed nutrient type & 8 % were of anemia of chronic disease.

**DISCUSSION**

It is seen in our study that iron deficiency anemia is more prevalent in 70 % of females & of children while in males

although lesser in number 42% were iron deficient. while 22% of females & 29% males were of mixed nutrients deficiency. So majority our anemic patients are iron deficient in all anemic patients. In many international studies iron deficiency anemia is a major cause of anemia. in certain global estimates show that IDA is prevalent in 30% non pregnant women & 47% of children under five years. The cost to cure this population may be in billion of dollars<sup>14,15</sup>. In a PubMed google Search to retrieve relevant scientific literature within span of 2 decades IDA in females of reproductive age group was found to be 50% <sup>16</sup>.so increasing the maternal mortality rate 276/100,000 as compared to 1/8000 in developed world<sup>17</sup>. The children are the other group although smaller in number in our studies showed IDA in 70%. which may be due to feeding practices in young children<sup>18</sup>. In our study the male female & children groups separately & collectively showed prevalence mixed nutrition deficiency in around 20% of anemic patients.

## CONCLUSIONS

It has been seen in our study that iron deficiency and mixed nutrient deficiency anemias are most commonly prevalent in female and children in rural population of Punjab, that may be due to poor intake of nutritious foods, As Pakistan is agricultural country & vegetables are easily available for the poor population of rural areas however their buying capacity and also their eating habits are not according to recommended medical principles. Second reason is poor hygienic conditions and prevalence of worm infestation especially of hook worm infestations are common, so all the patients with iron or mixed nutrient deficiency should be investigated for stool complete examination to rule out worm infestation or other gut disorders. THEY should also be advised dietary, hygienic measures and be prescribed pharmacological treatment. Also in difficult cases other laboratory investigations are to be employed for differentiating micronutrient deficiencies from anemia of chronic diseases <sup>20</sup>. Similarly the food supplements are to be added in children diet<sup>19</sup>.

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