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Utility of RDW (Red Cell Distribution Width) and Other Indices in the Evaluation of Microcytic Anemia

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ABSTRACT
BACKGROUND: Iron deficiency anemia and thalassemia minor are microcytic and hypochromic types of anemia commonly found in our environment. Iron deficiency anemia is the most important cause of microcytic hypochromic anemia. Red cell distribution width (RDW) provides quantitative assessment of anisocytosis and could be helpful in differentiating iron deficiency anemia from other microcytic anemias. The objective behind this study was to assess the role of RDW and other indices in diagnosing microcytic anemia.
MATERIAL & METHOD: A total of 150 cases of microcytic anemia (MCV <80fl) were included in the study. RDW values and other indices were obtained on an automated hematology analyser.
RESULT: RDW is increased in iron deficiency anemia while it is normal in beta thalassemia minor, RBC mass is normal or reduced in iron deficiency anemia while it is increased in thalassemia. A mentzer index of more than 13 suggests that the patient has iron deficiency, and an index of less than 13 suggests that the patient has the thalassemia trait.
CONCLUSIONS: RDW has a high sensitivity and can be used as a simple, economical, reliable automated red blood cell parameter for initial diagnosis of iron deficiency anemia.
KEYWORD: Red cell distribution width, Iron deficiency anemia, Thalassemia.

I. INTRODUCTION

Iron deficiency anemia (IDA) is the most prevalent micronutrient deficiency in the world.(1),The multitude of clinical presentations and pathogenesis makes the evaluation of anemias, ever challenging and significant.(2)

Microcytic hypochromic anemia is one of the commonest hematological abnormality encountered in routine practice. Small red blood cells known as microcytes, with MCV<80 fl can arise from iron deficiency, chronic diseases, hemoglobinopathies, lead poisoning.(3-4) Beta-thalassemia is the most commonly inherited hemoglobinopathy and often is presumptively diagnosed as iron deficiency anemia when based only on red blood cell (RBC) indices and morphologic features. Differentiation of these microcytic anemias is of clinical importance, particularly in a multi-ethnic Indian population, because each has entirely different cause, pathogenesis, prognosis and treatment.

The RBC parameters gives an effective quantitative assessment of red blood cells. MCV facilitates the morphological diagnosis of anemia. However, red cell distribution width (RDW) is important and better index to characterize microcytic anemias and help in distinguishing between uncomplicated iron deficiency anemia from uncomplicated heterozygous thalassemia.(5,6,7) The objective is to determine the role of red cell distribution width (RDW) and Mentzer index in differentiating between iron deficiency anemia (IDA) and anemia secondary to β-thalassemia trait.

II. MATERIALS AND METHODS

This is an observational study of 150 cases of microcytic anemia with reduced mean corpuscular volume (MCV<80 fl)The present study was carried out in the Hematology lab, GMERS medical college, Gandhinagar from March,2022 to August,2022.The samples were obtained during the course of routine analysis and collected in EDTA anticoagulant tubes. The Hb concentration, MCV and RDW values in all cases were obtained by automated haematology analyzer.

Mentzer index was calculated as the MCV/RBC ratio in which patients with a value of <13 is diagnosed as thalassemia carriers while a value of >13 is found in patients with iron deficiency anemia.

III. RESULTS

A total of 150 cases of microcytic anemia (MCV <80 fl)were included in this study. Out of this 84% were female and 16% were male. Gender wise distribution of cases is shown in figure no.1.

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Among them the youngest patient was 1 year old while the oldest was of 67 years of age. Maximum number of patients were in the age group of 21-30 years (42%) followed by 33% in the age group of 11-20 years and 9.3 % in the age group of 31-40 years.

FIGURE NO 1: GENDER WISE DISTRIBUTION OF MCV (< 80 FL)

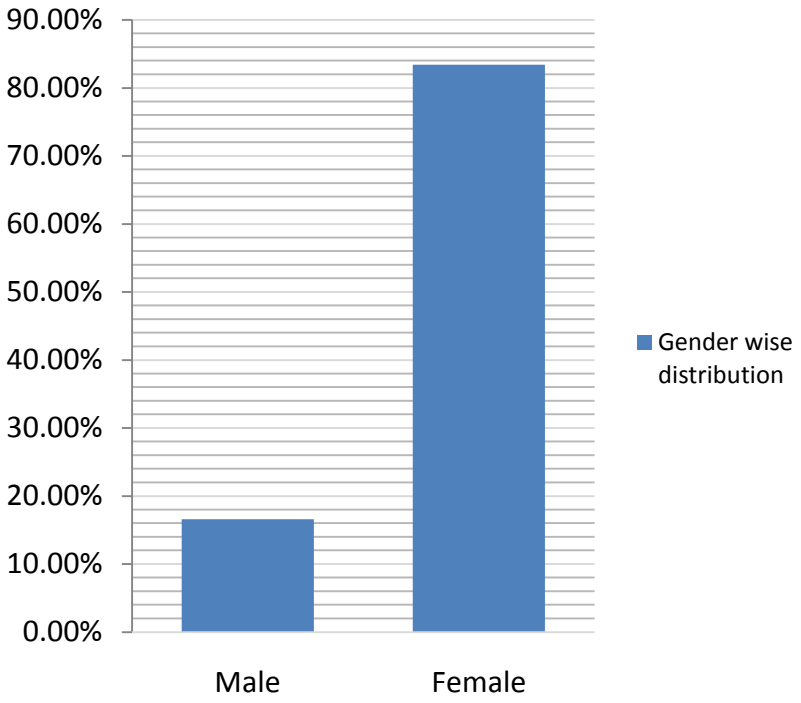

TABLE NO 1: AGE WISE DISTRIBUTION OF RDW

AGE WISE DISTRIBUTION OF RDW							
RDW (%)	**Age groups (years)**						
	1-10	11-20	21-30	31-40	41-50	51-60	61-70
<11	0	4	2	0	0	0	1
11-15	3	28	27	*	0	4	0
>15	13	18	34	5	1	2	0
Total	**15**	**50**	**63**	**14**	**1**	**6**	**1**

TABLE NO 2: GENDER WISE DISTRIBUTION OF MENTZER INDEX

MENTZER INDEX			
	Male	**Female**	**Total**
<13	24	15	39
>13	12	99	111
Total	36	111	150

IV. DISCUSSION

Prevalence of anemia is high in India and is widely seen in all age groups; the major cause of which is iron deficiency anemia.[8]

In our study, of the 150 anemic cases, females were 84% and males were 16%. Maximum number patients were in the age group of 21-30 years , followed by age group of 11-20 years. This observation is in concordance with observations made by Sharma et al.[9]

RDW has emerged as a better RBC index to differentiate iron deficiency anemia from other causes of microcytosis especially thalassemia trait(9). It is the first RBC index to become abnormal during the development of IDA. RDW represents the coefficient of variation of RBC

volume distribution and is an index of heterogeneity.

In present study, 49% cases had an abnormal RDW which is most common in age group of 21-30 years ,followed by 11-20 years of age group. Raised RDW in iron deficiency anemia is also noted in Sharma et al and Chaudhary et al.

The blood indices of all the cases were studied and Mentzer index was calculated for all the cases of iron deficiency anemia and beta thalassemia trait. Out of 150 cases, 39 (26%) had Mentzer index less than 13, in which 24 cases were male and 15 cases were female. 111 (74%) had Mentzer index more than, in which 12 cases were male and 99 were female. This observation is in concordance with observation made by Gopchade et al.[(10)]

Out of 39 cases, which had Mentzer index less than 13, 8 cases were of beta thalassemia trait which was confirmed by HPLC. Out of 8 cases, 2 cases were of Female and 6 cases were of Male.

V. CONCLUSION

Present study underlined the importance and role of RDW in diagnosis of iron deficiency anemia. In a scenario of high prevalence of anemia in our country and even higher costs of specialized tests, the need to adopt cost effective, accurate and efficient measures is required. RDW has a relatively high sensitivity in diagnosing iron deficiency anemia and therefore, can be used as a low cost initial investigation for distinguishing iron deficiency anemia from other causes of microcytic anemias.

Beta thalassemia trait and iron deficiency anemia are the conditions causing microcytic hypochromic anemia. Though the definitive diagnosis depends upon iron studies and HPLC, in cases where these studies are not possible Mentzer index can be used to screen the patients. Hence, the Mentzer index can be used as a reliable diagnostic screening tool, however, confirmation by HPLC will be needed.

REFERENCES

[1]. DeMaeyer E, Adiels-Tegman M. The prevalence of anemia in the world. World Health Stat Q 1985; 38: 302-316.

[2]. Chaudhary M, Sharma D, Shekhawat DS, Dabi D. Significance of red cell distribution width in the diagnosis of iron deficiency anemia: an observational study from India. J Pediatr Neonatal Care.2015;2(6):00102. 3. Jadhav MN, Agarwal SA

[3]. Nesa A, Tayab A, Sultana T, Khondker L, Rahman Q, Karim A, et al. RDWI is better discriminant than RDW in differentiation of iron deficiency anemia and beta thalassaemia trait. Bangladesh J Child Health. 2009;33(3):100-3.

[4]. Aulakh R, Sohi I, Singh T, Kakkar N. Red cell distribution width (RDW) in the diagnosis of iron deficiency with microcytic hypochromic anemia. Indian J Pediatr. 2009;76(3):265-7.

[5]. Jadhav MN, Agarwal SA, Kadgi NV, Khedkar SS. Utility of automated RBC parameters in evaluation of anemia. Int J Healthcare Biomed Res. 2015;3(3):170-181.

[6]. Santosh S, Kushal KK, Ramesh AC. A study on red cell distribution width in relation to other iron (red cell) indices with special reference to reticulocyte count before and after oral iron therapy in iron deficiency anemia. Int J Basic Applied Med Sci. 2013;3(1):292-9.

[7]. Perkins SL. Examination of blood and bone marrow. In: Greer JP et al, editors. Wintrobe's clinical hematology. 12th ed. Philadelphia: Lippincott Williams and Wilkins:2009;1-20.

[8]. Pandya AN, Agarwal M, Dave D. Red cell distribution width as a screening tool in classifying microcytic hypochromic anemias. J Evolution Med Dent Sci. 2014;3(23):6559-65.

[9]. Van ZD, Bieger R, Van WRKA, Castel A, Hermans J. Evalution of microcytosis using serum ferritin and red blood cell distribution width. Eur J Haematol. 1990;44:105-8.

[10]. Massey AC. Microcytic anemia. Differential diagnosis and management of iron deficiency anemia. Med Clin North Am. 1992 May;76(3):549-66