Original Research Paper Pathology

Evaluation of Microcytic Hypochromic Anaemia Based on Serum.ferritin

Dr. Najma R.A M.D	Post graduate, Department of Pathology Meenakshi Medical College Hospital and Research Institute, Kanchipuram,Tamilnadu, India
Dr .Divya.J M.D	Post graduate, Department of Pathology Meenakshi Medical College Hospital and Research Institute, Kanchipuram,Tamilnadu, India.
Dr. V.Eswari	Professor,Department of Pathology ,Meenakshi Medical College Hospital and Research Institute, Kanchipuram,Tamilnadu, India
Dr .V.Banumathy	Professor and HOD,Department of Pathology,Meenakshi Medical College Hospital and Research Institute, Kanchipuram, Tamilnadu, India.

ABSTRACT

INTRODUCTION: *Microcytic hypochromic anaemia is characterised by decreased haemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and normal to increased red cell distribution width (RDW). The peripheral blood smear shows microcytic cells containing less Hb (hypochromic), anisocytosis and poikilocytosis. Serum ferritin(S.Ferritin) concentrations suggests the level of circulating ferritin related to body stores of iron. Ferritin iron forms a reserve which can be drawn on when necessary for the synthesis of haemoglobin or other iron containing compounds. This is of particular importance in states of negative iron balance, and under these conditions storage iron is mobilized and eventually entirely depleted.*

AIM: *A descriptive study to evaluate microcytic hypochromic anemia based on Serum.Ferritin (S.Ferritin).*

MATERIALS AND METHODS: *1123 patients were referred to our lab with anaemia for investigations. 100 patients were selected for the study after proper clinical examination, history taking and screening for microcytic hypochromic anaemias. Peripheral smear examination, hematological parameters and S.Ferritin were done for the selected100 samples .*

RESULTS: *S.Ferritin levels are decreased in Iron deficiency anemia (IDA),increased in Anemia of chronic disease(ACD) and decreased to normal in combined anaemia of chronic disease and iron deficiency anaemia.*

CONCLUSION: *S.Ferritin along with peripheral smear examination and automated haemogram are helpful in distinguishing iron deficiency anaemia and anaemia of chronic disease, but not helpful in distinguishing them from combined anaemia of chronic disease and iron deficiency anaemia.*

KEYWORDS : MICROCYTIC HYPOCHROMIC ANAEMIA, S.FERRITIN

INTRODUCTION

Heightened awareness in recent years of the adverse consequences of anaemia has prompted further efforts to reduce its prevalence. Anaemia, defined as a low blood haemoglobin concentration, has been shown to be a public health problem that affects low, middle and high-income countries and has significant adverse health consequences, as well as adverse impacts on social and economic development [1,2,3]. It is a global health problem which has affected both developed and developing nations.

Morphologically, anaemia is classified into microcytic hypochromic, macrocytic and normocytic normochromic anaemia. Causes for microcytic hypochromic anaemia are Iron deficiency anaemia, Anaemia of chronic disease, Disorders of globin synthesis, Sideroblastic anaemia, Lead intoxication[4]. The ability to sample and measure a segment of the ferritin pool in the body provides a method for the direct assessment of body iron stores.

MATERIALS AND METHODS

iia) EXPERIMENTAL DESIGN

This study entitled " EVALUATION OF MICROCYTIC HYPOCHROMIC ANAEMIA BASED ON SERUM.FERRITIN " is a cross-sectional descriptive study done in Meenakshi medical college and Research Institute, Kanchipuram from 2014 – 2016.

In the study period, 1123 patients were referred to our lab with anaemia for investigations. 100 patients were selected for our study after applying inclusion and exclusion criteria. A thorough history taking and complete clinical examination was done followed by evaluation of haematological parameters and peripheral smear examination which were stained with Leishman's stain. S.Ferritin was done for all the cases. Being an invasive and painful procedure, bone marrow examination was excluded from the study.

INCLUSION CRITERIA

1. Age group – 21- 50 years
2. Sex – both males and females
3. Haemoglobin </= 8gm%

EXCLUSION CRITERIA

1. Immunocompromised patients
2. Known cases of haemolytic anaemia
3. Pregnancy/lactation
4. Dimorphic anaemia
5. Patients on treatment with iron or who had blood transfusion in the past three months.

S.Ferritin was estimated by immunoenzymometric assay.

STATISTICAL ANALYSIS

As our study was a cross sectional descriptive study, statistical analysis was not done.

ETHICAL CONCERN

Ethical clearance was obtained from the ethical committee meeting conducted at Meenakshi medical college.

RESULTS AND OBSERVATION

Of the 100 patients who were selected for the study, 58 were females and 42 were males.

The age group of selected 100 patients range from 21 – 50 years. Majority of the patients came under the age group of 41 – 50 years.

In our study, most of the patients presented with easy fatiguability (94%), palpitation (86%), breathlessness (68%), loss of appetite and weight.

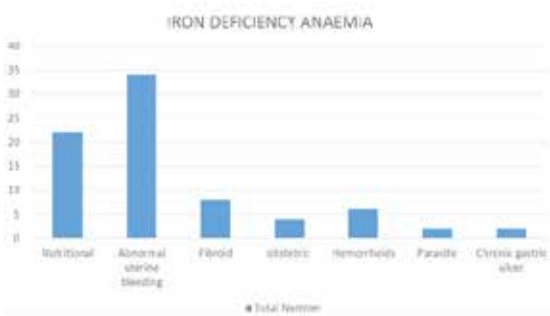
Out of 58 females, 72% presented with menorrhagia and irregular cycles.

On examination, 98 out of 100 patients were found to have pallor.

Among the 100 patients with microcytic hypochromic anaemia, 78 were diagnosed to have iron deficiency anaemia, 18 patients were diagnosed to have anaemia of chronic disease and 4 patients were found to have combined anaemia of chronic disease and iron deficiency anaemia.

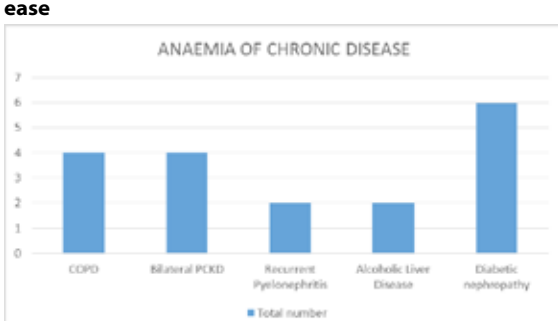
Out of the 78 patients who were diagnosed to have iron deficiency anaemia, 22 patients had nutritional cause, 34 patients had abnormal uterine bleeding, 8 patients had uterine fibroid, 6 patients had haemorrhoids, 1 patient had multiple pregnancy and 3 had history of repeated miscarriage, 2 patients had hook worm infestation and 2 had chronic gastric ulcer.

Graph 1: Etiological Patterns of Iron deficiency anaemia



Of the 18 patients with anaemia of chronic disease, 6 patients had early onset diabetic nephropathy, 4 had chronic obstructive pulmonary disease (COPD), 4 had bilateral polycystic kidney disease, 2 had recurrent pyelonephritis and 2 had alcoholic liver disease.

Graph 2: Etiological Patterns of Anaemia of chronic disease



Out of the 4 patients with combined anaemia of chronic disease and iron deficiency anaemia, two patients had rheumatoid arthritis with iron deficiency anaemia and two had COPD with iron deficiency anaemia.

The average red blood cell (RBC) count in our study is 3.11million/mm^3.

TABLE 1: RELATIONSHIP BETWEEN MCV AND ETIOLOGY

ETIOLOGY	LOW MCV	NORMAL MCV	HIGH MCV
IDA	58	20	0
ACD	14	4	0
ACD+IDA	3	1	0

ACD + IDA – Combined anaemia of chronic disease with iron deficiency anaemia.

TABLE 2: RELATIONSHIP BETWEEN MCH AND ETIOLOGY

ETIOLOGY	LOW MCH	NORMAL MCH	HIGH MCH
IDA	56	22	0
ACD	12	6	0
ACD + IDA	3	1	0

TABLE 3: RELATIONSHIP BETWEEN RDW AND ETIOLOGY

ETIOLOGY	RDW-Normal	RDW-Increased
IDA	14	64
ACD	13	5
ACD+IDA	1	3

The S.Ferritin in our study range from 10 – 420 ng/ml.

Out of the 78 iron deficiency anaemia cases, all the 78 cases showed decreased S.Ferritin. All the 18 cases of anaemia of chronic disease showed increased S.Ferritin. Out of the 4 cases of combined iron deficiency anaemia with anaemia of chronic disease, 2 cases showed decreased S.Ferritin and 2 cases showed normal S.Ferritin.

DISCUSSION

Females are predominant in our study which accounts to 58%. This is similar to the study conducted by Susan Kolahi et al which showed 53.4% of females.[5]

Pallor was seen in 98% of cases in our study. This also correlates with the study done by Khatri et al[6] which showed pallor in 95% males and 97 % females.

Among the 58 female patients, 42 patients had menorrhagia due to various reasons like abnormal uterine bleeding and fibroid. This would account for 72% where as the study done by Fiona Barr et al quoted a prevalance of 9 – 14% in women of age group 17- 50 in Western European populations and 20 % in China[7].

In patients with iron deficiency anaemia, 74 % had low MCV. This correlates with the literature study of 70%[8]. In patients with anaemia of chronic disease, 77% had low MCV. The literature shows that anaemia of chronic disease may also present with low MCV[9].

RDW is increased in 64 out of 78 iron deficiency anaemia cases which would account for 82%. This is similar to the 90% quoted by Marsh W Jr et al[10].

All 78 cases (100%) of iron deficiency anaemia showed decreased S. Ferritin which can be compared with the study done by Frank H Wians et al[11]. 20 cases showed normal MCV with low S.Ferritin which can be explained by the fact that patients would have been in the storage iron depleted stage[12].

All 18 cases (100%) of anaemia of chronic disease showed increased S.Ferritin which can be compared to Study done by Frank H. Wians et al11. Serum ferritin concentration is directly related to reticuloendothelial iron stores. Ferritin show acute phase responses to inflammation as its synthesis is enhanced by interleukin – 1 which is the primary mediator of the acute phase response. Thus, in the presence of inflammation, ferritin concentrations may be high(13,14)

According to the literature[15], combined anaemia of chronic disease with iron deficiency anaemia shows normal to low S.Ferritin which is seen as decreased S.Ferritin in 2 cases and normal S.ferritin in 2 cases.

CONCLUSION

Automated haemogram along with peripheral smear examination is beneficial for the diagnosis of majority of cases of microcytic hypochromic anaemia. S.Ferritin is helpful in distinguishing Iron deficiency anaemia and Anaemia of chronic disease but not in distinguishing them from combined anaemia of chronic disease and iron deficiency anaemia. Hence, further iron studies along with S.Ferritin might help in such challenging cases.

REFERENCES

1. ALCÁZAR L. The economic impact of anaemia in Peru. Lima: Group for the Analysis of

Development and Action Against Hunger
2. HORTON S Levin C. Commentary on "evidence that iron deficiency anemia causes reduced work capacity". J Nutr. 2001;131:691S–6S
3. STEVENS GA Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F et al. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. Lancet Glob Health. 2013;1:E16–E25. doi:10.1016/ S2214-109X(13)70001-9.
4. EHSANI E. Shahgholi, M.S. Rahiminejad, F. Seighali and A.Rashidi A NewIndex for Discrimination Between Iron Deficiency Anemia and Beta-Thalassemia Minor:Results in 284 Patients Pakistan Journal of Biological Sciences Year: 2009 | Volume: 12 | Issue: 5 | Page No.: 473-475.
5. SUSAN KOLAHI Halea Farzin, Manouchehr Khoshbaten, Tabriz University, Faculty of Medicine, Drug Applied Research Center, Tabriz,Iran, HYPOCHROMIC MICROCYTIC ANEMIA IN NORTHWESTERN OF TABRIZ, IRAN,,Eur J Gen Med 2008;5(3):178-180
6. A.KHATRI A.Khavatkar, S.Puranik,Department of pathology,B J Government Medical college & SGH,Pune, Evaluation of red cell distribution width and other indices in microcytic anaemias,Medical journal of western India,February 2013,vol 41,issue1
7. FIONA BARR Loretta Brabin, Shola Agbaje1, Fiekumo Buseri2, John Ikimalo2 and Nimi Brigg,1. Liverpool School of Tropical Medicine, Pembroke Place, Liverpool L3 5QA, UK,2. University of Port, Harcourt, East-West Road, Choba, Port Harcourt, Nigeria, Reducing iron deficiency anaemia due to heavy menstrual blood loss in Nigerian rural adolescents, Public Health Nutrition Volume 1 (4), 249– 257, 1998
8. BEUTLER E Fairbanks VF: The effects of iron deficiency, in: Iron in Biochemistry and Medicine II, edited by A Jacobs, M Worwood, p393. Academic Press, New York.
9. RAVI SARMA Chapter 152Red Cell Indices, Clinical Methods: The History, Physical, and Laboratory Examinations. 3rd edition. Walker HK, Hall WD, Hurst JW, editors., 1990. Boston: Butterworths
10. MARSH WL JR Bishop Jw, Darcy TP. Evaluation of RDW Department of laboratory medicine ,naval hospital, SanDiego,California.Hematol.Pathol.1987;1(2);117-23
11. FRANK H. WIANS Jr, PhD, Jill E. Urban, MD, Joseph H. Keffer, MD, and Steven H. Kroft, MD,Discriminating Between Iron Deficiency Anemia and Anemia of Chronic Disease Using Traditional Indices of Iron Status vs Transferrin Receptor Concentration,Am J Clin Pathol 2001;115:112-118
12. SHIRISH M KAWTHALKAR, Essentials of haematology, second edition, section 2, chapter 3 Anaemias due to impaired red cell production page no 82.
13. Dr.Jay.B.Wish, University hospitals of Cleveland and department of medicine,Assessing iron status: beyond serum ferritin and transferrin saturation.CJASN September 2006 vol 1 no. supplement 1 S4-8.
14. DACIE AND LEWIS Practical haematology, 11th ed, chapter 9, iron deficiency anaemia and iron overload, page no:184
15. J. CELI K. Samii, A. Perrier J.-L. RenyDrs Julien Celi et Jean-Luc Reny Pr Arnaud Perrier Service de médecine interne générale, Département de médecine interne, réhabilitation et gériatrie, Dr Kaveh Samii Service d'hématologie Département des spécialités de médecine HUG, 1211 Genève 14, Anémie ferriprive, inflammatoire ou mixte : comment orienter le diagnostic ?Rev Med Suisse 2011 ; 7 : 2018-23