Section: Pathology

Original Research Article

LABORATORY EVALUATION IN MEGALOBLASTIC ANAEMIA AT TERTIARY CARE CENTRE

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Received *: 25/04/2025*
Received in revised form *: 19/05/2025*
Accepted *: 05/06/2025*

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DOI: 10.70034/ijmedph.2025.2.444

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 2452-2456

ABSTRACT

Background: The most common type of nutritional anemia is Iron deficiency anemia. Though folate and vitamin B12 deficiency also contributes to nutritional deficiency anemia, much emphasis is not laid on them. Hence the present study was taken up to know the various clinical features associated with megaloblastic anemia and correlate them with serum Vitamin B 12 and folic acid levels so that the etiology can be known, and therapy can be initiated early. Megaloblastic anemia (MA) encompasses a heterogeneous group of anemias characterized by the presence of megaloblasts in the bone marrow. The aim and objective is to study laboratory evaluation in Megaloblastic anemia at tertiary care centre.2 To study causes of megaloblastic anemia.3. To study age wise and Gender wise prevalence of Megaloblastic anemia among study cases. 4.Study various risk factors of megaloblastic anemia.

Materials and Methods: Cross sectional study, Study setting: Department of Pathology in Dr. PDMMC, hospital and research centre, Amravati.(Tertiary care centre) Study duration: 6mth from September 2024 to March 2025. Study population: The study population included all the cases with MCV more than 100 fl such cases included in the study. Sample size: 100

Results: Majority of cases were found in above 60 years group e.g.32 followed by 46-60 years age group 29 cases, 22 cases in 31-45 years age group, 26-35 years age group 12 cases and 2 cases found in 18-25years age group. Most of study participants were Males, majority of cases Dietary Pattern were pure vegetarian 59 cases and 41 cases reported mixed dietary pattern. most of cases diagnosed with Moderate anemia 42 followed by Mild anemia 31 cases and 27 cases with Severe anemia, majority of cases diagnosed with deficient serum Vit B12 level below 200 pg/ml 71 cases.

Conclusion: Predominantly occurs in pure-vegetarian populations, Most of the patients were reported moderate to severe anaemia. The most common presenting complaint in megaloblastic anemia was generalized weakness/ fatigue, anorexia, edema, and weight loss. Most common cause of megaloblastic anemia was deficiency of Vit B12

Keywords: Megaloblstic anemia, folic acid, Vit B12.

INTRODUCTION

Nutritional anemia results when the dietary intake of nutrients is insufficient to meet the demands for the synthesis of hemoglobin and RBCs. The most common etiology is iron deficiency which contributes to almost 42% of cases in children under five years of age worldwide. However, this proportion of anemia due to iron deficiency varies depending on the age, sex, and the prevalence of other factors for anemia in that region.

Deficiency of vitamins A, riboflavin (B2), pyridoxine (B6), cobalamin (B12), C, E, folic acid, and copper will also result in anemia. Megaloblastic anemia usually results from a deficiency of either cobalamin (Vitamin B12) or folate, but may arise because of inherited or acquired abnormalities affecting the metabolism of DNA synthesis. Nutritional

megaloblastic anemia in children occurs commonly among under- nourished or malnourished societies of tropical and subtropical countries.

The prevalence of megaloblastic anemia (MA) reported by various Indian studies ranges from 02% to 40%.[1-6] Most of these studies were carried out in children and in hospitalized patients. MA remains the commonest cause of macrocytic anemia and pancytopenia.[7,8]

The most common type of nutritional anemia is Iron deficiency anemia. Though folate and vitamin B12 deficiency also contributes to nutritional deficiency anemia, much emphasis is not laid on them. Hence the present study was taken up to know the various clinical features associated with megaloblastic anemia and correlate them with serum Vitamin B 12 and folic acid levels so that the etiology can be known, and therapy can be initiated early. Megaloblastic anemia (MA) encompasses a heterogeneous group of anemias characterized by the presence of megaloblasts in the bone marrow.[9]

This condition is due to impaired DNA synthesis, which inhibits nuclear division. Cytoplasmic maturation, mainly dependent on RNA and protein synthesis, is less impaired; this leads to an asynchronous maturation between the nucleus and cytoplasm of erythroblasts, explaining the large size of the megaloblasts.[10] This process affects the entire hematopoiesis as well as rapidly renewing tissues such as gastrointestinal cells. Megaloblastic anemia is most often due to hypovitaminosis, specifically vitamin B12 (cobalamin) and folate, which are necessary for the synthesis of DNA.[11]

Picture No: 1 Megaloblastic anemia Picture no: 2 Peripheral blood smear showing hypersegmented neutrophils, characteristic of megaloblastic anemia.

Aim and Objective:

1. To study causes of megaloblastic anemia
2. To study age wise and Gender wise prevalence of Megaloblastic anemia among study cases
3. Study various risk factors of megaloblastic anemia

MATERIALS AND METHODS

Study design: Cross sectional study

Study setting: Department of Pathology in Dr. PDMMC, hospital and research centre, Amravati

Study duration: 6mth from September 2024 to March 2025

Study population: The study population included all the cases with MCV more than 100 fl such cases included in the study.

Inclusion Criteria

1. Age ranging from 18 yrs and above
2. Peripheral smear showing MCV >100fl
3. Patient attending IPD and OPD at tertiary care centre satisfying inclusion criteria.
4. Data collection from new cases.
5. Anemic Patient – In Male, hemoglobin level < 13gm/dl

In Female, hemoglobin level < 11.5gm/dl

Exclusion Criteria

1. Normocytic Normochromic peripheral blood smear.
2. Only Microcytic peripheral blood smear
3. Patient not giving informed consent

Approval for the Study

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of pathology department was obtained. After obtaining informed verbal consent from All age group patients whose blood sample from both male and female patients came in tertiary care center which are referred to Pathology Department by the Clinicians such cases included in the study.

Sample Size: 100

Sampling Technique: Convenient sampling technique used for data collection.

Methods of Data Collection and Questionnaire

Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, religion, occupation, residential address, and date of admission, dietary pattern.

Medical history- chief complain, past history, general examination, systemic examination. All the procedures and investigations conducted under direct guidance and supervision of pg guide. Proforma of megaloblastic anemia notes maintained.

Methods /techniques to be used for diagnostic criteria:

1. CBC by Coulter Act diff Hematology cell counter -3part differential or 5 part differential model.(3 parts model no-AGD-300, 5part model no-DXH-560)
2. PS examination of Lieshman's stained smear.
3. Serum Vit B12 and Folate Assays –CLIA/RIA whichever is available

Data Entry and Analysis

The data were entered in Microsoft Excel and data analysis was done by using SPSS demo version no 21 for windows. The analysis was performed by using percentages in frequency tables and correlation of stroke. $p<0.05$ was considered as level of significance using the Chi-square test.

RESULTS

The present Cross sectional study was done among 100 cases admitted to tertiary care centre during study period.

Above table shows that majority of cases were found in above 60 years group e.g.32 followed by 46-60 years age group 29 cases, 22 cases in 31-45 years age group, 26-35 years age group 12 cases and 2 cases found in 18-25years age group.

Table 1: Distribution of cases according to age (N=100)

Age in years	Frequency	Percentage
18 -25	2	2%
26-35	12	12%
36-45	22	29%
46-60	29	22%
Above 60	32	32%
Total	100	100 (100%)

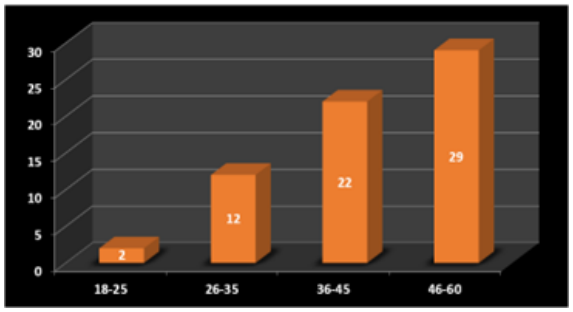

Figure 1: Distribution of cases according to age (N=100)

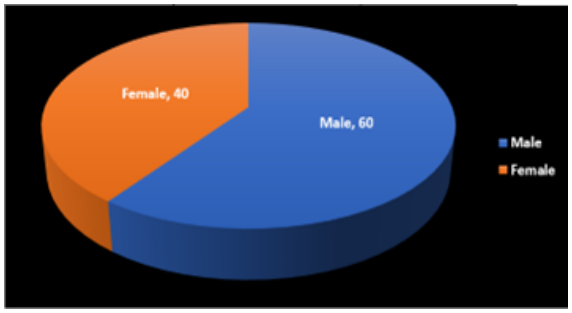

Figure 2: Distribution of cases as per sex (N=100)

Table 2: Distribution of cases as per sex (N=100)

Gender	Frequency	Percentage
Male	60	60%
Female	40	40%
Total	100	100 (100%)

[Table 2] shows that majority of study participants were Males contributing 60 (60%) and Females 40 (40%)

Table 3: Distribution of cases according to dietary pattern (N=100)

Dietary Pattern	Frequency	Percentage
Mixed	41	41%
Pure vegetarian	59	59%
Total	100	100 (100%)

Above table shows that majority of cases Dietary Pattern were pure vegetarian 59 cases and 41 cases reported mixed dietary pattern.

Table 4: Distribution of cases as per severity of anemia (Hb %)

Severity of anemia	Frequency	Percentage	severity of anemia
Mild	31	31%	Mild
Moderate	42	42%	Moderate
Severe	27	27%	Severe
Total	100	100 (100%)	Total

Above table shows most of cases diagnosed with Moderate anemia 42 followed by Mild anemia 31 cases and 27 cases with severe anemia

Table 5: Distribution of cases as per Serum Vit B12 and Folic acid level

Serum Vit B12	Frequency	Percentage
Below 200 pg/ml	71	71%
200-300 pg/ml	11	11%
Above 300 pg/ml	18	18%
Serum Folic acid		
Below 3.0 ng/ml	11	11%
3-20.5 ng/ml	75	75%
Above 20.5 ng/ml	14	14%
Total	100	100 (100%)

The above table shows majority of cases diagnosed with deficient serum Vit B12 level below 200 pg/ml 71 cases followed by 11 cases found with Borderline between 200-300 pg/ml and 18 cases observed with normal B 12 level, 11 cases diagnosed with low serum folic acid below 3.0ng/ml followed by 75 cases with normal range and 14 cases observed with above 20.5ng/ml level

Table 6: Distribution of cases as per clinical features (N-100)

Clinical Features	Frequency	Percentage
Weakness/fatigue	89	89%
Swelling over the body	41	41%
Weight loss	22	22%

Fever	08	08%
Anorexia	58	58%
Abdominal pain	11	11%
Breathlessness	14	14%
Urinary abnormalities	05	05%
Neurological symptoms	02	02%

The above table shows most common clinical features was weakness 89 cases followed by anorexia 58 cases, swelling 41 cases, weight loss in 22, breathlessness 14, abdominal pain 11, urinary abnormalities 5 and 2 cases with neurological symptoms.

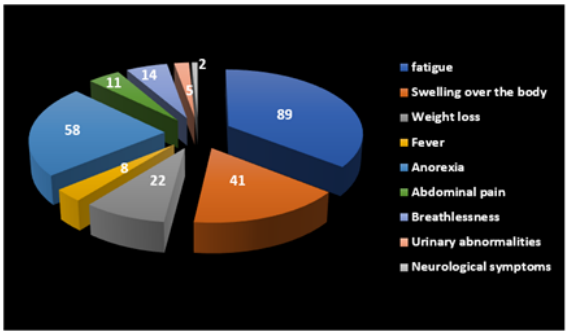

Figure 3: Distribution of cases as per clinical features (n-100)

DISCUSSION

Vitamin B12 deficiency may present with variable clinical manifestations, but the most common presentation is megaloblastic anemia. Folate deficiency is also another important cause of megaloblastic anemia. In this study, majority of cases were found in above 60 years group e.g.32 followed by 46-60 years age group 29 cases, 22 cases in 31-45 years age group, 26-35 years age group 12 cases and 2 cases found in 18-25years age group our finding was comparable with the Kaur et al,[12] and Khanduri et al,[13] which suggest that MA is more prevalent in young age Present study observed most of study participants were Males contributing 60 (60%) and Females 40 (40%),Our result was similar to Ratre BK, et al,[14] Rawat S et al,[15] and Gupta M et al.[16]

In present study most of cases diagnosed with Moderate anemia 42 followed by Mild anemia 31 cases and 27 cases with Severe anemia our finding was concordance with the Choudhary Pet al,[17] and Mishra R et al.[18] Current study observed megaloblastic anaemia was higher among pure vegetarian persons, similar finding also found by Gupta RK et al,[19] and KK Magnani, et al.[20] Strict vegetarians are at high risk as vitamin B12 does not occur in vegetable and fruits. Gastric atrophy, malabsorption and deficiency of intrinsic factors (required for vitamin B12 absorption) are the reasons for developing MA.

In our study common symptoms of megaloblastic anaemia were weakness, fatigue, anorexia, swelling all over the body and exertional dysnoea these finding correlate with previous studies: Vikas J et al,[19] Clarke R et al.[21] In current study majority of cases diagnosed with deficient serum Vit B12 level below 200 pg/ml 71 cases followed by 11 cases found with Borderline between 200-300 pg/ml and 18 cases observed with normal B 12 level, 11 cases diagnosed with low serum folic acid below 3.0ng/ml followed by 75 cases with normal range and 14 cases observed with above 20.5ng/ml level

CONCLUSION

Majority of cases were found in above 60 years group, Predominantly occurs in pure-vegetarian populations, Most of the patients were reported moderate to severe anaemia. The most common presenting complaint in megaloblastic anemia was generalized weakness/ fatigue, anorexia, edema, and weight loss. Most common cause of megaloblastic anemia was deficiency of Vit B12.

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