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ORIGINAL ARTICLE

Vitamin B 12 deficiency….The predominant cause of macrocytic anemia in pediatric population visiting Children hospital Lahore

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ABSTRACT

Objectives: The purpose of this scrutiny was to note the part played by folic acid and vitamin B 12 inadequacies resulting in macrocytic anemia in pediatric community visiting our institute.

Study Design: Retrospective cross sectional study

Place and duration: Department of Hematology and Transfusion Medicine, The Children Hospital, University of Child Health Sciences, Lahore from Jan 2021 to Dec 2021.

Methodology: Medical data of 294 children demonstrating features of megaloblastic anemia were scrutinized. Records related to complete blood count (CBC) specially hemoglobin level, MCV, MCH, MCHC, peripheral blood findings, serum folic acid and vitamin B 12 amounts were noted from registers along with the other relevant medical presenting, past and family socioeconomic history.

Results: Out of total 294 cases with CBC and peripheral blood findings of macrocytic anemia, 160 were males and 134 found to be females. Mean age was 57 months (4.75 years). Vitamin B12 insufficiency alone was noted in 162 (55.1%) cases, folic acid alone appeared to be deficient in only 8 cases where as combined paucity of both was noticed in 30 cases.

Conclusion: Vitamin B12 deficiency found to be the predominant cause of macrocytic anemia in children referred to our institution with 65.3 % of total case population. Considering its significance in the regulation of nervous system, awareness programs with proper guidance are essential to deal this manageable issue.

Key words: Megaloblastic anemia, macrocytosis, cobalamin, Vitamin B 12 deficiency, Folic acid deficiency, Anemia, Lahore Pakistan

INTRODUCTION

Anemia is a commonly encountered trouble all over the world involving at least 33 % of population. The diet related anemia are especially more frequent in developing countries.[1,2] The worldwide occurrence of anemia up to 5 years of age is 43%.[3]

According to Pakistan National Nutrition Survey 2018, majority (53.7%) of pediatric age group are anemic in Pakistan. Out of which 40 t0 70 % especially under 5 years of age are microcytic especially due to iron deficiency anemia.[3]

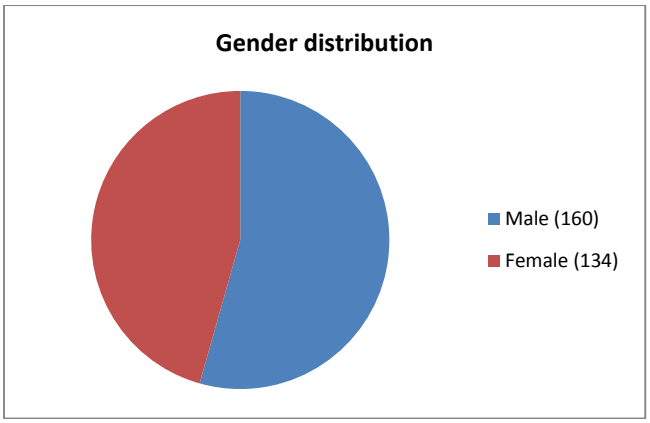
Macrocytic anemias are comparatively considered infrequent that generally precipitated due to deficiency of cobalamin and folic acid. However, in addition to diet related troubles, they are also found as a consequence of chronic hepatic disorders, thyroid troubles esp. hypothyroidism, atrophic gastritis, celiac sprue, myelodysplastic diseases,[4,5] drug induced malabsorption,[6,7] alcohol usage and low consumption due to psychiatric disabilities.[8] Certain studies conducted in Pakistan claimed megaloblastic anemia as the commonest of all anemias.[2] Various other studies conducted in Pakistan also claim the commonness of B 12 and folic acid deficiency anemias.[9] Macrocytic anemias are not rare; however, due to paucity of data the exact prevalence along with its various causes are not clear. This prompted us to initiate this study for the estimation of the prevalence of macrocytic anemia and for the assessment of its various causes in our institution.

MATERIAL AND METHODS

A retrospective detailed scrutiny of the medical records of 294 children with findings suggestive of macrocytic anemia was done. Laboratory registers, medical record charts and test request forms were meticulously explored in reference to case history (presenting complaints, past history, nutritional, drug intake, socioeconomic & family history), examination findings, laboratory and other investigations. All children with low hemoglobin level, high MCV, MCH, MCHC on CBC and macrocytes on peripheral blood morphology were segregated. Their serological test results including vitamin B12, folic acid levels, Liver function tests etc were noted. Other investigation findings like ultrasound, gastric endoscopy, histopathology (if done) were also recorded. All the particulars were assessed to find out the respective frequencies of various causes of macrocytic anemia. Descriptive statistical analysis of continuous parameters (age, laboratory investigations like CBC, Vitamin B12, serum folic acid etc) were measured as mean; whereas the categorical parameters including male female gender, cobalamin and folic acid paucity etc were measured as frequency and percentage.

RESULTS

Gender distribution of 294 patients with peripheral blood picture and laboratory investigations suggestive of macrocytic anemia was 160 (54.4 %) males and 134 (45.6 %) females.



Mean age found was 57 months (4.75 years). It was observed that 162+30= 192 (65.3 %) out of total 294 patients found to have vitamin B12 deficiency; whereas only 8+30=38 (12.9 %) children

had folic acid deficiency. In ninety four cases, both vitamin B 12 and folate were in normal range. Among these 94 cases, 13 had deranged LFT's, 11 were hypothyroid, 09 had congenital heart disease, 08 were Down syndrome patients, 5 were diagnosed to have atrophic gastritis, 12 had history of off and on drug intake due to recurrent infections and 4 were immunodeficient.

Distribution of macrocytic anemia cases according to various causes

Various causes of macrocytic anemia	No. and percentage of cases
Vitamin B12 deficiency	192 (65.3 %)
Folic acid deficiency	38 (12.9 %)
Combined deficiency of Vitamin B12 and folate	30 (10.2 %)
Other causes	94 (32.0 %)

Distribution of conditions leading to macrocytosis according to various age groups

Age group	B12 Deficiency only	Folate deficiency only	Combined deficiency of B12 & Folic acid	Both normal	Total no. of cases
< 1 year	20	-	08	12	40
1 year	10	04	08	-	22
2 years	54	02	04	20	80
3 years	18	-	02	14	34
4 years	06	-	04	08	18
5 years	06	-	-	-	06
6 years	02	-	-	-	02
7 years	10	02	02	06	20
8 years	08	-	-	02	10
9 years	-	-	-	06	06
10 years	04	-	-	08	12
11 years	04	-	-	04	08
12 years	04	-	02	-	06
13 years	04	-	-	08	12
14 years	08	-	-	04	12
15 years	04	-	-	02	06
Total	162	08	30	94	294

DISCUSSION

Macrocytic anemia applies to the situation where size of erythrocytes becomes larger than normal.[10]

It is further divided into two categories: megaloblastic and non megaloblastic anemias. There are four principal reasons of macrocytosis: poor nutrition, myelodysplastic syndromes (bone marrow disease), drug associated and chronic illness.[11]

The mean age of children with macrocytosis found in our study was 57 months (4.75 years) comparable to 5.7 years in study by Sarbay H.[11]

Macrocytosis appeared to be comparatively more common in males (54.4 %) than females (45.6 %) in our study. Almost similar negligible difference in gender distribution (male/ female: 51.4 %/48.6%) is observed in other studies.[12,13]

In the present study, the macrocytosis was most commonly seen in toddlers (46.25 %) with the highest percentage in children 2 years of age (27.2 %). This is in concordance with the study by Ng'eno BN et al.[14]

In most of these cases, the reason of macrocytosis was Vitamin B12 deficiency (alone 55.10% and combined 65.3%) consistent with several other studies where the prevalence of vitamin B12 deficiency found to be 64.8% and 63.7 %.[12,15]

This appeared to be more prevalent in toddlers (37.4 %) and children up to 6 years of age (39.5%). This correlates well with several other studies conducted on Indian and Mexican children where the prevalence of 36 % and 37.6 % was noted in toddlers of India and 36 % in children up to 6 years old in Mexico.[16,17,18]

The similar prevalence of vitamin B 12 deficiency in toddlers was also noted in a study conducted in China.[19]

The prevalence of folic acid alone was found to be very low (2.7 %) in the present study and (12.9 %) as part of combined deficiency. Most of these cases were also seen in toddlers.

Similar low prevalence of folic acid as a cause of macrocytic anemia is seen in several other studies.[18,20,21] Not a single case of folic acid alone deficiency was found in infants in our study. A study conducted in Nepal also revealed similar results.[22] This is probably due to presence of sufficient amount of folic acid in breast milk as most of the children in our study were on mothers breast feeding.[23] Secondly people in our country like to eat fresh fruits and green leafy vegetables, peanuts, beans etc and along with it folic acid supplements are also prescribed and definitely taken by mothers during pregnancy.[14]

A large majority (31.9 %) of children in our study presenting with macrocytic anemia were neither vitamin B12 nor folic acid deficient. Among these patients, the reason for macrocytosis was found to be certain indisputable well known causes like liver disorders,[11,24,25] hypothyroidism,[26] congenital heart disease,[11,27] autoimmune gastritis and other digestive disorders,[28,29] Down syndrome,[11,30] certain drugs related,[11,28]

CONCLUSION

The survey disclosed the increase frequency of cobalamin deficiency in pediatric population of Lahore and periphery referred to our institution. The paucity appeared to be more common in younger children especially toddlers. Due to its importance in the neurologic development and regulation, the issue must be brought to public attention with proper guidance to cope-with this easily manageable issue.

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