ORIGINAL ARTICLE

Frequency of Megaloblastic Anemia in Pediatric Patients Presenting with Peripheral Cytopenia

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ABSTRACT

Background: Anemia influences approximately 20 million people around the world mostly women and children. Megaloblastic anemia, a common cause of anemia caused by ineffective erythropoiesis, commonly manifested by peripheral blood cytopenia.

Objective: To find out the frequency of megaloblastic anemia in pediatric patients presenting with peripheral cytopenia

Methodology: This descriptive cross sectional study was carried out at the Department of Hematology, Hayatabad Medical Complex, Peshawar from 19 Feb, 2019 to 19 Aug, 2019. All the participants were selected based on inclusion criteria. Hematological profile was recorded for the entire participant. Automated hematology analyzer was used for all the blood counts. Data analysis was carried out by using IBM SPSS version 23.

Results: Totally 175 patients were enrolled in our study. There were 117 (66.85%) males patients whereas female patients were 58 (33.14%). Based on age distribution, 65 (37.14%) patients were recorded in 5-10 years age group, 110 (62.85%) patients were recorded in 11-15 years age group. Mean and SDs for age was recorded as 12.3+3.19. Megaloblastic anemia was observed in 23 (13.14%) patients.

Conclusion: Our study concludes that megaloblastic anemia is highly prevalent in pediatric patients presenting with peripheral cytopenia. Pancytopenia is a common condition in our pediatric patients caused by failure of bone marrow and leukemia.

Keywords: Anemia, Bone Marrow, Megaloblastic, Pancytopenia

INTRODUCTION

Anemia influences approximately 20 million people around the world mostly women and children [1]. Megaloblastic anemia, a common cause of anemia caused by ineffective erythropoiesis, commonly manifested by peripheral blood cytopenia. They are mostly due to nutritional insufficiency of either vitamin B12 or folate or both, hereditary disorders of DNA formation, or after certain medicinal therapies [2].

Pancytopenia is a simultaneous decrease in the number of red blood cells, platelets and white blood cells. The frequency of disorders leading to pancytopenia differs according to gene mutations and geographical location [3, 4]. The criteria for specifying pancytopenia is Hemoglobin <10g/dl, total leukocyte count <4000/L and platelet count of <150 x 10^9/L [5, 6]. A wide group of disorders may present with cytopenias including megaloblastic anemias [7]. The main cause for megaloblastic anemia is nutritional deficiency particularly in big population and low wage groups [8].

Pancytopenia in Megaloblastic anemia is a common clinical presentation in Pakistan [9]. Pakistan is even below other low wage nations in health and population outcomes. Preschool children are about 18% of our population and because of poor nutrition, around 50-60% are anemic. Infant mortality is at an alarmingly high level in this country, with 10% of infants dying before reaching their first birthday and another 14% dying before they reach the age of 5. Malnutrition and anaemia affect one out of every three children [10].

Vitamin B12 deficiency anemia is seen in babies who are breast fed exclusively by mothers with strict vegetarian diet [7].. Some conditions associated with pancytopenia are completely treatable while others can be treated to decrease morbidity, for that reason more studies are required to investigate nature of pancytopenia. Such work will be useful to reduce patient misery, prolong survival and enhance quality of life [11]. However with respect to frequency, responsible factors and related symptoms in megaloblastic anemia in pediatric patients, there is limited data available in Pakistan [12]. The present study is concerned to find out the epidemiological aspects of the disease which will greatly help in the early diagnosis of the disease. Megaloblastic anemia usually presents with different signs and symptoms so if one is not aware of the variable presentation of the disease, it may delay the diagnosis of an easily treatable condition for quite a long time which, in turn will affect the prognosis of the disease [13, 14].

MATERIALS AND METHODS

This descriptive cross sectional study was carried out at the Department of Hematology, Hayatabad Medical Complex, Peshawar. The study duration was six months from 19 Feb, 2019 to 19 Aug, 2019 after synopsis approval. The study approval was properly given by the ethical and research committee of the concerned institute. Sample size was 175. Using 13.04% proportion of megaloblastic anemia [14], 95% confidence interval and 5% margin of error using WHO software for sample size. Consecutive (non-probability) sampling technique was employed. The criteria

for inclusion in our study includes all patients having age limit between 5 to 15 years having signs and symptoms of anemia (Hb less than 10g/dL) that is pallor, fatigue and shortness of breath, patient having platelet count less than 150×10^9/L, patient having recurrent infections (TLC less than 4000/L) and patients having any symptom of malabsorption like diarrhea or any symptom related to vitamin B12 or folate deficiency like tingling in hands and feet and glossitis while the criteria for exclusion includes all patients less than 5 years and more than 16 years and having congenital disorders like hemophilia, aplastic anemia, acute and chronic leukemias, disseminated intravascular coagulation, skin infections, osteomyelitis or osteogenesis imperfecta, patient taking medications like anticoagulants, immunosuppressant or any other bone marrow suppressants or taking radiation therapy. All such cases were assessed clinically and in lab and were excluded from the study. Informed consent in written was taken from all the subjects in the study. Clinical examination was carried out for the entire subject and the required data was documented on a predesigned Performa. Hematological profile was recorded for the entire participant. Automated hematology analyzer was used for all the blood counts. Giemsa stain was used for the peripheral blood and bone marrow smears. Special stains like reticulin staining and Pearls method was carried out for Reticulocyte count and Iron respectively. Trephine biopsies were stained with hematoxylin and eosin. Data analysis was carried out by using IBM SPSS version 23. Mean +/- standard deviation was calculated for numerical variables and Frequencies and percentages were calculated for categorical variable.

RESULTS

This study was carried out on 175 patients at the Department of Hematology, MTI-HMC, Peshawar. Based on age distribution, 65 (37.14%) patients were recorded in 5-10 years age group, 110 (62.85%) patients were recorded in 11-15 years age group. Mean and SDs for age was recorded as 12.3+3.19 (Figure 1). In the current study, 117 (66.85%) patients were recorded as male patients, 58 (33.14%) patients were female patients. (Figure2) Based on socio-economic status, 94 (53.71%) were found to be from poor families, 40 (22.85%) patients were from middle class families while 41 (23.42%) patients were from rich families. (Table1). In our study, 23 (13.14%) patients were recorded with megaloblastic anemia. (Figure 3)
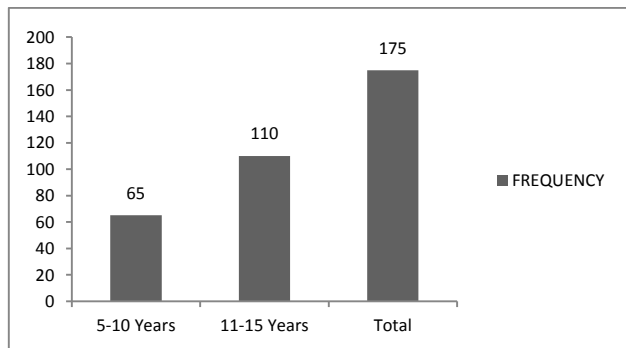

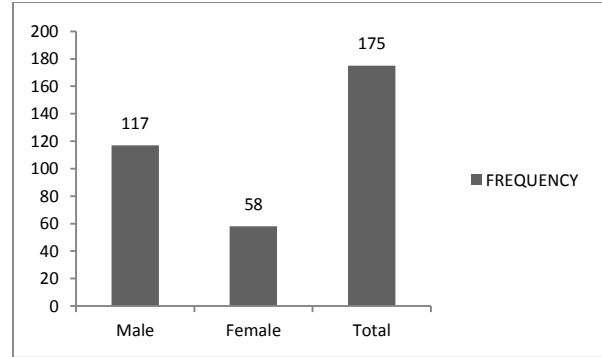Figure 1: Distribution of subjects based on age

Figure 2: Distribution of subjects based on gender

Table 1: Socio-economic status of the subjects

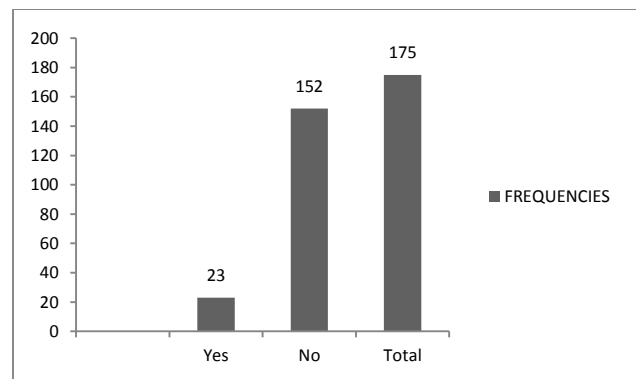| Socio economic status	Frequency	Percentage
Poor	94	53.71%
Middle Class	40	22.85%
Rich	41	23.42%
Total	175	100%

Figure 3: Frequency of megaloblastic anemia in subject's peripheral cytopenias

DISCUSSION

Pancytopenia in Megaloblastic anemia is a common clinical presentation in Pakistan [9]. Pakistan is even below other low wage nations in health and population outcomes. Preschool children are about 18% of our population and because of poor nutrition, around 50-60% are anemic. Infant mortality is at an alarmingly high level in this country, with 10% of infants dying before reaching their first birthday and another 14% dying before they reach the age of 5. Malnutrition and anaemia affect one out of every three children [10].

In the pediatric population of developing countries, megaloblastic anaemia is quite frequent. It is a kind of macrocytic anemia characterized by a folic acid, vitamin B12, or combined vitamin B12 and folic acid deficiency. Malnutrition-induced megaloblasic anaemia is relatively rare in wealthy nations, although it is frequent globally [15].

In the current study, based on age distribution, 65 (37.14%) patients were recorded in 5-10 years age group, 110 (62.85%) patients were recorded in 11-15 years age group. The age group 5-10 years was also the predominant group in another study [16].

In the current study, 117 (66.85%) patients were recorded as male patients, 58 (33.14%) patients were

female patients. Male were dominant in our study than female. This was in accordance with the previous study from Peshawar who reported more male subjects in their study as compared to female subjects. In their study male to female ratio was 2:1 [17]. Other studies also observed similar findings and reported that male were more in number as compared to females in their study [18, 19]. Pancytopenia is a disorder in which all three peripheral blood lineages are reduced; it's a frequent hematological issue that has to be recognized on basis of symptoms when a patient arrives with an inexplicable pallor. In our study, 23 (13.14%) patients were recorded with megaloblastic anemia. In accordance with our study, a study carried out by Adil et al. reported 12.6% frequency of megaloblastic anemia in pediatrics population [20]. In contrary to our finding other study reported low prevalence of megaloblastic anemia in pediatrics population. A Peshawar based study reported a very low prevalence (0.8%) of megaloblastic anemia [21] while another study done by Shazia Memon reported it as 3.57% [12].

Different studies reported the frequency of megaloblastic anemia in pediatric patients ranging from 11 to 47% [22]. A previous study carried out by Bhatanger in India reported 28.4% prevalence of megaloblastic anemia in children presenting with pancytopenia [23]. Another study done by Gomber et al. reported 11% prevalence of megaloblastic anemia in pediatric patients presenting with pancytopenia [24]. A study carried out by Mukiibi et al. and Sarode et al. reported a very high prevalence of megaloblastic anemia as 47% and 80.5% respectively [11, 25].

CONCLUSION
Our study concludes that megaloblastic anemia is highly prevalent in pediatric patients presenting with peripheral cytopenia. Pancytopenia is a common condition in our pediatric patients caused by failure of bone marrow and leukemia.

REFERENCES
1. De Benoist B, Cogswell M, Egli I, McLean E. Worldwide prevalence of anaemia 1993-2005; WHO global database of anaemia. 2008.
2. Azaad MA, Li Y, Zhang Q, Wang H. Detection of pancytopenia associated with clinical manifestation and their final diagnosis. Open journal of blood diseases. 2015;5(03):17.
3. Baig MA. Evaluation of bone marrow aspirate in paediatric patients with pancytopenia: a 2 years study. 2015.
4. Dasgupta S, Mandal PK, Chakrabarti S. Etiology of Pancytopenia: An observation from a referral medical institution of Eastern Region of India. Journal of laboratory physicians. 2015;7(02):090-5.
5. Dobrozsi S, Flood VH, Panepinto J, Scott JP, Brandow A. Vitamin B12 deficiency: the great masquerader. Pediatr Blood Cancer. 2014;61(4):753-5.
6. Kakepoto G, Iqbal M, Iqbal S. COMMUNICATIONS-Megaloblastic anaemia in a hospital-based population. Med Sci Res. 2000;28(1):45-8.
7. Khattak MB, Ismail M, Marwat ZI, Khan F. Frequency and characterisation of pancytopenia in megaloblastic anaemia. Journal of Ayub Medical College Abbottabad. 2012;24(3-4):53-5.
8. Allen LH. Impact of vitamin B-12 deficiency during lactation on maternal and infant health. Integrating Population Outcomes, Biological Mechanisms and Research Methods in the Study of Human Milk and Lactation. 2002:57-67.
9. Hashim H, Tahir F. Frequency of vitamin B12 and folic acid deficiencies among patients of megaloblastic anaemia. Ann Pak Inst Med Sci. 2006;2(3):192-4.
10. Mannan M, Anwar M, Saleem M, Wiqar A, Ahmad M. A Study of Serum Vitamin B~ 1~ 2 and Folate Levels in Patients of Megaloblastic Anaemia in Northern Pakistan. JOURNAL-PAKISTAN MEDICAL ASSOCIATION. 1995;45:187-.
11. Sarode R, Garewal G, Marwaha N, Marwaha R, Varma S, Ghosh K, et al. Pancytopenia in nutritional megaloblastic anaemia. A study from north-west India. Trop Geogr Med. 1989;41(4):331-6.
12. Memon S, Shaikh S, Nizamani M. Etiological spectrum of pancytopenia based on bone marrow examination in children. J Coll Physicians Surg Pak. 2008;18(3):163-7.
13. Dowling MM, Quinn CT, Plumb P, Rogers ZR, Rollins NK, Koral K, et al. Acute silent cerebral ischemia and infarction during acute anemia in children with and without sickle cell disease. Blood, The Journal of the American Society of Hematology. 2012;120(19):3891-7.
14. Bateman ST, Lacroix J, Boven K, Forbes P, Barton R, Thomas NJ, et al. Anemia, blood loss, and blood transfusions in North American children in the intensive care unit. Am J Respir Crit Care Med. 2008;178(1):26-33.
15. Glader B. Megaloblasic Anemia. Nelson's Textbook of Paediatrics, 18th edition WB Saunders. 2008:2011-4.
16. Ayub T, Khan FUR. Prevalence of megaloblastic anaemia in a paediatric unit. Gomal Journal of Medical Sciences. 2009;7(1).
17. Khan A, Aqeel M, Khan TA, Munir A. Pattern of hematological diseases in hospitalized paeditric patients based on bone marrow examination. Journal of Postgraduate Medical Institute. 2008;22(3).
18. Goel R, Bhan M, Azamy S, Ahrary R, Srivastava R. A study of severe anemia in hospitalized children in Afghanistan. Indian Pediatr. 1981;18(9):643-6.
19. Ameileena C, Vipan C, Anubhava P, Harish C. Clinicoaetiological profile of pancytopenia in pediatric practice. JIACM. 2012;13(4):282-5.
20. Adil S, Kakepoto G, Khurshid M, Burney I. Epidemiological features of aplastic anaemia in Pakistan. Journal of Pakistan Medical Association. 2001;51:443.
21. Rehman HU, Mohammad F, Faiz Mohammad K. < The> etiology pattern of pancytopenia in children upto 15 years. 2003.
22. Niazi M. The iIncidence of underlying pathology in pancytopenia-an experience of 89 cases. Journal of Postgraduate Medical Institute. 2004;18(1).
23. Khunger JM, Arulselvi S, Sharma U, Ranga S, Talib V. Pancytopenia--a clinico haematological study of 200 cases. Indian J Pathol Microbiol. 2002;45(3):375-9.
24. Gomber S, Kela K, Dhingra N. Clinico-hematological profile of megaloblastic anemia. Indian Pediatr. 1998;35:55-8.
25. Mukiibi J, Makumbi F, Gwanzura C. Megaloblastic anaemia in Zimbabwe: spectrum of clinical and haematological manifestations. East Afr Med J. 1992;69(2):83-7.