DOI: 10.36347/sjams.2017.v05i03.027

Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2017; 5(3B):835-837 **ISSN 2347-954X (Print)**
©Scholars Academic and Scientific Publisher
(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com

Original Research Article

Bone Marrow Examination in Cases of Pancytopenia in Hospitalised Children – A 4 Years Study from a Tertiary Care Centre

Dr. R Panigrahi[1], Dr. P Misra[2], Dr. U Senapati[3]
[1]Associate Professor, Department of Pathology, Kalinga Institute of Medical Sciences, Bhubaneswar, 751024
[2]Assistant Professor, Department of Pathology, Kalinga Institute of Medical Sciences, Bhubaneswar, 751024
[3]Professor, Department of Pathology, Kalinga Institute of Medical Sciences, Bhubaneswar, 751024

***Corresponding author**
Dr. Ranjita Panigrahi
Email: ranjita_panigrahi@yahoo.com

Abstract: This study was carried out to analyse the clinical and hematological findings in children below 15 years presenting with pancytopenia and to identify the different causes of pancytopenia based on bone marrow examination. It was a retrospective and prospective study conducted over a period of 4 years in the Hematology section of Department of Pathology, Kalinga Institute of Medical Sciences, a tertiary care hospital in Odisha, India. It included hospitalized children below 15 years who presented with pancytopenia .Detail clinical history & hematological findings were recorded, peripheral blood smears were studied. Bone marrow aspiration smears & trephine biopsy were examined. A total of 53 cases were included in our study group. They underwent bone marrow aspiration for pancytopenia and it constituted 15.6 % of the total cases. Age range was 1-14 years. Male: female ratio was 1:1.3. The commonest cause was megaloblastic anemia seen in 25 cases (47.2%) followed by aplastic / hypoplastic anemia in 10 cases (18.9%), and hematological malignancy in 7 cases (13.2%). Acute lymphoblastic leukemia was the commonest hematological malignancy. Bone marrow aspiration is an easy and safe procedure to establish diagnosis in cases of pancytopenia in children. Megaloblastic anemia was the commonest diagnosis in our study. Since it is a easily treatable condition, early identification & prompt notification can have positive impact in the further management of these patients.
Keywords: Bone marrow aspiration, hypoplastic anemia, acute leukemia, megaloblastic anemia, pancytopenia

INTRODUCTION

Pancytopenia is a common disease entity encountered in day to day clinical practice. Peripheral cytopenia is defined as reduction in either of the cellular elements of blood, i.e., red cells, white cells or platelets. Bicytopenia is reduction in any of the two cell lines and pancytopenia is reduction in all the three [1].

The etiology of bicytopenia and pancytopenia varies widely in children, ranging from transient marrow viral suppression to marrow infiltration by life-threatening malignancy. These may also be caused iatrogenically, secondary to certain drugs, chemotherapy or radiotherapy for malignancies. The bone marrow picture may vary depending on the etiology, from normocellular with non-specific changes to hypercellular being replaced completely by malignant cells. [8]. Many authors have studied patients with pancytopenia [2, 3]. But such data relating to pediatric patients is less commonly found in literature. The present study was undertaken to analyse the clinical presentation, hematological findings and bone marrow morphology of children presenting with pancytopenia & to find out the frequency of various etiologies by bone marrow examination in these cases.

AIMS AND OBJECTIVES

This study was undertaken to analyse the clinical and hematological findings in hospitalized children below 15 years who presented with pancytopenia and to identify the different causes of pancytopenia based on bone marrow examination.

MATERIALS AND METHODS

The retrospective & prospective study was conducted over a period of 4 years (JAN 2013 –DEC 2016) at the hematology unit of the Department of Pathology , KIMS, BHUBANESWAR , Odisha, India.

The study group included children below 15 years of age of both the sexes, registered and referred for bone marrow examination to department of hematology. Children who were under chemotherapy were not included in our study. Detailed history, clinical examination and hematological parameters at presentation were recorded. Hematological profile included CBC, peripheral blood smear examination and bone marrow aspiration&/ or biopsy.

CBC was done on automated hematology analyzer (Sysmex XS 2000i / Beckman coulter-LH-750). Platelet counts obtained from counter were confirmed by peripheral blood smear examination. Panytopenia was defined as: hemoglobin < 10 gm/dL, total leukocyte count < 4×10^9/L and platelet count < 100×10^9/L [8]. Bone marrow aspiration and trephine biopsy were carried out as per the clinical indication. The bone marrow procedure and further staining was done using standard methods. All the bone marrow aspirate smears and trephine biopsies were stained with Leishman stain and hematoxylin and eosin, respectively. Special staining for myeloperoxidase , periodic acid Schiff and Perl's stain on aspirate smears and reticulin stain on biopsy was done, where and when indicated.

RESULTS

A total of 339 cases underwent bone marrow aspiration for various clinical conditions during the study period. 53 cases (15.6%) fulfilled our inclusion criteria and were included in our study.

Table 1: Age & sex distribution of the cases (n = 53)

Age group	Male	Female	Total (%)
<5 years	2	3	5 (9.4%)
5-9 years	7	10	17 (32.1%)
10-14 yrs	14	17	31 (58.5%)
Total	23	30	53 (100%)

The age of patients was in the range of 1 year - 14 years. M: F ratio was 1:1.3, showing a slight female preponderance. Maximum number of children belonged to the age group of 10 -14 years (58.5%). The commonest clinical sign was pallor seen in all the cases. Weakness and fatigue was the commonest symptom seen in 75.5% of cases. Other clinical presentations were fever, weight loss, bleeding manifestation, dyspnoea & lymphadenopathy.

Table 2 - Aetiological profile of pancytopenia (n = 53)

DIAGNOSIS	No .of cases	%
Megalo blastic anemia	25	47.2
Hypoplastic /aplastic anemia	10	18.9
Dual deficiency anemia	6	11.3
Erythroid hyperplasia	3	5.7
Hemophagocytosis	1	1.9
Acute lymphoblastic leukemia	7	13.2
Metastatic neuroblastoma	1	1.9
Total	53	100

DISCUSSION

Pancytopenia is a commonly encountered hematological condition in clinical practice. The frequency of pattern of diseases causing them varies in different population groups and this has been attributed to differences in methodology and stringency of diagnostic criteria, geographic area, period of observation, genetic differences, nutritional status, prevalence of infections and varying exposure to myelotoxic drugs among others [4]. There are varying reports on the underlying causes of pancytopenia in children from different authors from various parts of the world. In children, Bhatnagar *et al.;* [5] who retrospectively analyzed 109 pediatric patients presenting with pancytopenia, found megaloblastic anemia as the single most common etiological factor causing pancytopenia in 28.4% children, followed by acute leukemia and infections in 21% patients each, and aplastic anemia in 20% cases.

Gupta *et al.;* [6] reviewed 105 children aged 1.5–18 years with pancytopenia. In their study, aplastic anemia was the most common cause of pancytopenia (43%), followed by acute leukemia (25%). Naseem *et al.;* [8] also reported aplastic anemia as the commonest cause of pancytopenia in children. A study from Pakistan by Memon *et al.;* [7] on 230 pancytopenic children found the most common causes of pancytopenia as aplastic anemia, megaloblastic anemia. The common clinical presentations of pancytopenic children in their study were pallor, fever, petechial hemorrhages, visceromegaly and bleeding from nose and gastrointestinal tract.

In our present study, females outnumbered the males and pallor was the commonest clinical presentation. Megaloblastic anemia was the commonest cause of pancytopenia (47.2%) in children below 15 years which was comparable to the findings of Bhatnagar *et al.;* [5]. The cause megalo blastic anemia could not be ascertained in all the cases as it was out of the scope of this study. However in most of the cases where data was available vitamin B12 deficiency was the cause. Khunger *et al.;* [9] studied 200 cases of pancytopenia including both adults and children. Megalo blastic anemia contributed to 72% of the total cases in their study. In our present study, besides the common causes of pancytopenia, i.e., megaloblastic anemia, aplastic anemia, acute leukemia other causes of pancytopenia, like hemophagocytosis & metastatic neuroblastoma were also identified. Metastatic deposits were detected on marrow trephine biopsy where aspirations yielded no material. Thus trephine biopsy proved useful and was complimentary in cases where material was scanty or in cases where there was a dry tap.

CONCLUSION

The high prevalence of nutritional anemia in Indian subjects can be attributed as the cause of increased frequency of megaloblastic anemia in our study. The cause of megalo blastic anemia in most of the cases was vitamin B12 deficiency. Most of the studies done in India show megaloblastic anemia as the commonest cause which is in sharp Contrast to studies from other parts of the world where aplastic anemia is the commonest cause. So the present study stresses the importance of megaloblastic anemia as a major cause of pancytopenia in children. Being a rapidly correctable disorder, early detection and prompt notification can be very helpful in unsuspected cases and a simple, cheap and easy procedure like bone marrow examination can be really helpful to the pediatrician in the diagnosis & further management of the patient.

REFERENCES

1. Bates I, Bain BJ. Approach to diagnosis and classification of blood diseases. In: Lewis SM, Bain BJ, Bates I, editors. Dacie and Lewis Practical Haematology. 10th ed. Philadelphia: Churchill Livingstone; 2006: 609-24.
2. Kumar R, Kalra SP, Kumar H, Anand AC, Madan H. Pancytopenia--a six year study. The Journal of the Association of Physicians of India. 2001 Nov;49:1078-81.Jha A, Sayami G, Adhikari RC, Panta AD, Jha R. Bone marrow examination in cases of pancytopenia. J Nepal Med Assoc 2008; 47:12-7.
3. International agranulocytosis and aplastic anemia study. Incidence of aplastic anemia: The relevance of diagnostic criteria. Blood 1987; 70:1718-21.
4. Bhatnagar SK, Chandra J, Narayan S, Sharma S, Singh V, Dutta AK. Pancytopenia in children: etiological profile. Journal of tropical pediatrics. 2005 Aug 1; 51(4):236-9.
5. Gupta V, Tripathi S, Tilak V, Bhatia BD. A study of clinico-haematological profiles of pancytopenia in children. Tropical doctor. 2008 Oct; 38(4):241-3.
6. Memon S, Shaikh S, Nizamani MA. Etiological spectrum of pancytopenia based on bone marrow examination in children. J Coll Physicians Surg Pak. 2008 Mar 1; 18(3):163-7.
7. Naseem S, Varma N, Das R, Ahluwalia J, Sachdeva MU, Marwaha RK. Pediatric patients with bicytopenia/pancytopenia: review of etiologies and clinico-hematological profile at a tertiary center. Indian Journal of Pathology and Microbiology. 2011 Jan 1; 54(1):75.
8. Khunger JM, Arunselvi S, Sharma U, Ranga S, Talib VH. Pancytopenia- a clinico-hematological analysis of 200 cases. Indian J Pathol Microbiol 2002; 45:375- 9.