Research Article

Clinical and hematological profile of pancytopenia in children in rural tertiary care hospital

Chate Sambhaji C[1*], Kagne Swati S[2]

{[1]Assistant Professor, Department of Paediatrics} {[2]Assistant Professor, Department of Obstetrics and Gynaecology}
Swami Ramanand Teerth Rural Government Medical College and General Hospital, Ambajogai, Maharashtra, INDIA.
Email: drsambhaji@gmail.com

Abstract

Introduction: Pancytopenia is a common occurrence in paediatric patients. The etiology of pancytopenia in children is varied, ranging from nutritional and infectious causes to aplasia and marrow infiltration by fatal malignancy. Knowing the exact etiology is helpful for specific treatment and prognostication. **Aim**: To evaluate the etiological and clinico-hematological profile of children with pancytopenia **Methods**: This study was carried out in rural tertiary care hospital over a period of 1 year. Children with pancytopenia from 3 month of age till 12 years of age were included in the study. Complete hemogram, reticulocyte count, Peripheral smear, bone marrow aspiration and bone marrow trephine biopsy were performed. **Result**: Forty-six patients from 3 month of age to 12 years of age were studied. Fever (67.3%) was the most common presenting symptom followed by pallor (63%). The most common cause of pancytopenia in children was found to be megaloblastic anaemia (30.4%), followed by aplastic anaemia (26%) and malignancy (19.5%). **Conclusion**: The megaloblastic anaemia is most common cause of pancytopenia in children in our study followed by aplastic anaemia and acute leukaemia.

Keywords: Aplastic anemia, Megaloblastic anemia, Pancytopenia

[*]**Address for Correspondence:**
Dr. Chate Sambhaji C, Assistant Professor, Department of Paediatrics, Swami Ramanand Teerth Rural Government Medical College and General Hospital, Ambajogai, Maharashtra, INDIA.
Email: drsambhaji@gmail.com
Received Date: 02/04/2015 Revised Date: 10/04/2015 Accepted Date: 14/04/2015

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 16 April 2015

INTRODUCTION

Pancytopenia is defined as simultaneous presence of anaemia, thrombocytopenia and leucopenia[1]. Pancytopenia is a common occurrence in paediatric patients. Pancytopenia is usually a manifestation of either primary or secondary bone marrow disorders. Patients usually present with symptoms due to anaemia, leucopenia or thrombocytopenia. Etiology of pancytopenia in children is varied with etiologies ranging from easily treatable nutritional and infectious causes to bone marrow infiltration by fatal malignancy. Identification of etiology of pancytopenia is crucial as the underlying etio-pathology determines the management and prognosis of the patients. A study was undertaken to identify etiology, clinical profile and bone marrow findings in cases of pancytopenia in children.

MATERIALS AND METHODS

The study was conducted in a rural tertiary care hospital over a period of one year. Patients between 3 months to 12 years of age admitted with pancytopenia were included in the study. Pancytopenia was defined as haemoglobin <10 gm%, absolute neutrophil count (ANC) < 1,500/µl, and platelet count < 100,000/µl. Severe pancytopenia was defined as haemoglobin < 7 gm%, ANC < 500/µl, platelet count < 20,000/µl. A detailed history and physical examination was done at admission. Investigations at the time of admission included a complete hemogram using automated haematology analyser, with recording of haemoglobin, total and differential leucocyte counts, red blood cell indices (MCV, MCH, MCHC), and platelets. Reticulocyte counts, blood smear examination, bone marrow examination, and other investigations were done to reach

How to site this article: Chate Sambhaji C, Kagne Swati S. Clinical and hematological profile of pancytopenia in children in rural tertiary care hospital. *International Journal of Recent Trends in Science and Technology* April 2015; 14(3): 584-586 http://www.statperson.com (accessed 18 April 2015).

the diagnosis. Differential leucocyte and platelet counts were confirmed on blood smear examination. The bone marrow procedure and staining was done by standard methods.[2,3,4] All those cases in which the diagnosis could be confirmed were included in the final analysis.

RESULTS

46 children were diagnosed as having pancytopenia according to above mentioned criteria. Out of 46 patients of pancytopenia, 26 were males and 20 were females. The youngest child was 3 months old and oldest 12 years.

Table 1: Clinical presentation of pancytopenia in children

Clinical presentation	Number = 46 (%)
fever	31 (67.3%)
pallor	29 (63%)
bleeding	25 (54.3%)
hepatomegaly	26 (56.5%)
splenomegaly	19 (41.3%)
lymphadenopathy	7 (15.2%)
weight loss	11 (23.9%)
bone pain	2 (4.3%)

Table 1 depicts the most common clinical presentations of pancytopenic children. Fever (67.3%) was most common clinical feature followed by pallor (63%) and bleeding manifestations (54.3%). Hepatomegaly was present in 26 (56.5%) patients and splenomegaly was present in 19 (41.3%) patients. Bone pain was present in two patients with acute leukemia Table 2 shows the etiology of cases with childhood pancytopenia. Megaloblastic anaemia was seen in 14 (30.4%) cases – being the most common cause of pancytopenia followed by aplastic anaemia in 12 (26%) cases. Malignancies which included acute lymphoblastic leukaemia[5], acute myeloid leukaemia[2], Langerhans cell histiocytosis[1] and myelodysplastic syndrome[1] constituted 9 (19%) cases. Infections such as malaria[3], enteric fever[2], kala azar[1], bacterial septicaemia[1] and HIV with parvovirus[1] caused pancytopenia in 8 (17.3%) patients. The miscellaneous group included one case each of Gaucher's disease, hypersplenism due to extra hepatic portal vein obstruction and hemophagocytosis secondary to still's disease.

Table 2: Etiological classification of pancytopenia in children

Sr. No.	Diagosis	Number=46 (%)
1	megaloblastic anemia	14 (30.4%)
2	aplastic anemia	12 (26%)
	malignancy	9 (19.5%)
	ALL	5 (10.8%)
3	AML	2 (4.3%)
	MDS	1 (2.1%)
	LCH	1 (2.1%)
4	Infection	8 (17.3%)
	Malaria	3 (6.5%)
	Enteric fever	2 (4.3%)
	kala azar	1 (2.1%)
	septicemia	1 (2.1%)
	HIV with parvovirus	1 (2.1%)
	Miscellaneous	3 (6.5%)
5	Gaucher disease	1 (2.1%)
	Hypersplenism (EHPVO)	1 (2.1%)
	Hemophagocytosis	1 (2.1%)

Severe pancytopenia (Table 3) was seen in 11(23.9%) out of 46 patients. Among 11 patients with severe pancytopenia, Five (45.4%) had aplastic anaemia and acute leukaemia was present in 4 (36.3%) patients. one case each of of megaloblastic anaemia and septicaemia also had severe pancytopenia.

Table 3: Etiology of severe pancytopenia in children

Sr. No.	Diagnosis	Number= 11 (%)
1	aplastic anemia	5 (45.4%)
2	Malignancy	4 (36.3%)
3	megaloblastic anemia	1 (8.1%)
4	Infection	1 (8.1%)

Bone marrow cellularity with corresponding etiology is shown in table 4. bone marrow was cellular in 28 (60.8%) cases, while it was hypo-cellular in 18(39.1%) cases.

Table 4: Bone marrow cellularity in pancytopenia in children

Cellular bone marrow (Number=28)	
megaloblastic anemia	14 (50%)
Malignancy	9 (32%)
Infection	3 (10%)
Miscellaneous	2 (7%)

Hypocellular bone marrow (Number=18)	
aplastic anemia	12 (66%)
Infections	5 (27%)
Miscellaneous	1 (5%)

DISCUSSION

Pancytopenia refers to simultaneous reduction of all 3 peripheral blood lineages: erythrocytes, leukocytes and platelets. Pancytopenia is a common occurrence in paediatric patients. Accurate etiological diagnosis of pancytopenia is mandatory for specific treatment and prognostication. The frequency and pattern of diseases causing pancytopenia 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.[5] Diagnosis of pancytopenia requires detailed clinical history and examination, complete hemogram with RBC indices, reticulocyte count, blood smear examination followed by examination of a bone marrow biopsy

specimen and a marrow aspirate to assess overall cellularity and morphology. We studied etio-hematological profile of 46 children with pancytopenia admitted in tertiary care hospital. Jha *et al*[6] studied 148 cases of pancytopenia out of which 42 were children. Bhatnagar *et al*[7] and Gupta *et al*[8] studied 109 and 105 children with pancytopenia respectively. Fever (67.3%), pallor (63%) and bleeding (54.3%) and hepatomegaly (56.5%) were the most common clinical features found in our study which were similar to observations by Gupta *et al* [8], Memon *et al* [9] and Khodke *et al*[10]. Megaloblastic anemia (30.4%) was most common etiology of pancytopenia in children in our study followed by aplastic anaemia (26%), malignancy (19.5%) and infections (17.3%). Megaloblastic anaemia (28%) followed by aplastic anaemia (21%) and infections (21%) were most common causes of pancytopenia in children in a study done by bhatnagar *et al*[7]. Megaloblastic anaemia was also the commonest etiology of pancytopenia in studies done by Tilak *et al*[11], Savage *et al*[12], Khunger *et al*[13] and Khodke *et al*[10]. Gupta *et al*[8] and Memon *et al*[9] found that Aplastic anaemia was most common etiology of pancytopenia in children. In a study done by Imbert *et al*[14] in 213 adults with pancytopenia, malignancy (60%) was commonest etiology. pancytopenia occurred in many infections of which malaria was most common. The mechanisms of cytopenia in malaria are direct invasion by parasites, DIC, immune hemolysis, hypersplenism and hemophagocytosis[15]. Acute leukemia is the commonest malignancy leading to pancytopenia in children. Severe pancytopenia was detected in 11 (23.9%) cases, with aplastic anaemia and acute leukaemia accounting for most of them. severe pancytopenia occurred in 25.2% children with pancytopenia in a study done by Bhatnagar *et al*[7]. Bone marrow was cellular in 28 (60.8%) cases while it was hypo-cellular in 18 (39.1%) cases in our study. The bone marrow cellularity was hypo-cellular in 14%, hyper-cellular in 75%, and normocellular in 11% of the patients in a study of 100 patients done by rangaswamy *et al*.[16]

CONCLUSION

Megaloblastic anaemia and aplastic anaemia are the most common aetiologies of pancytopenia in children. Most cases of severe pancytopenia in children are caused by aplastic anaemia and acute leukaemia. Common clinical features of childhood pancytopenia are fever, pallor and bleeding. Accurate etiopathological diagnosis of pancytopenia is necessary for specific treatment and prognostication.

REFERENCES

1. Saxena R, Pati HP, Mahapatra M. De Gruchy's Clinical Hematology in Medical Practice. 6th Adapted Edition. London: Blackwell Science; 2013. p. 106-19
2. Bain BJ, Lewis SM. Preparation and staining methods for blood and bone marrow films. In: Lewis SM, Bain BJ, Bates I, editors. Dacie and Lewis Practical Haematology. 10th ed. Philadelphia: Churchill Livingstone; 2006. p. 59-78
3. Bates I. Bone marrow biopsy. In: Lewis SM, Bain BJ, Bates I, editors. Dacie and Lewis Practical Haematology. 10th ed. Philadelphia: Churchill Livingstone; 2006. p. 115-30s
4. Swirsky D, Bain BJ. Erythrocyte and leucocyte cytochemistry. In: Lewis SM, Bain BJ, Bates I, editors. Dacie and Lewis Practical Haematology. 10th ed. Philadelphia: Churchill Livingstone; 2006. p. 311-34
5. International agranulocytosis and aplastic anemia study. Incidence of aplastic anemia: The relevance of diagnostic criteria. Blood 1987;70:1718-21
6. 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
7. Bhatnagar SK, Chandra J, Narayan S, Sharma S, Singh V, Dutta AK. Pancytopenia in children: Etiological profile. J Trop Pediatr 2005;51:236-9
8. Gupta V, Tripathi S, Tilak V, Bhatia BD. A study of clinico-haematological profiles of pancytopenia in children. Trop Doct 2008;38:241-3
9. Memon S, Salma S, Nizamani MA. Etiological spectrum of pancytopenia based on bone marrow examination by children. J Coll Physicians Surg Pak 2008;18:163-7
10. Khodke K, Marwah S, Buxi G, Yadav RB, Chaturvedi NK. Bone marrow examination in cases of pancytopenia. J Indian Acad Clin Med 2001; 2:55-9.
11. Tilak V, Raini J. Pancytopenia- a clinico-hematological analysis of 77 cases. Indian J Pathol Microbiol 1999;42:399-404
12. Savage DG, Allen RH, Gangaidzo IT, Levy LM, Gwanzura C, Moyo A, *et al*. Pancytopenia in Zimbabwe. Am J Med Sci 1999;317:22-32
13. 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
14. Imbert M, Scoazec JY, Mary JY, Jouzult H, Rochant H, Sultan C. Adult patients presenting with pancytopenia: A reappraisal of underlying pathology and diagnostic procedures in 213 cases. Hematol Pathol 1989;3:159-67
15. Perrin LH, Mackey LJ, Miescher PA. The hematology of malaria in man. Semin Hematol 1982; 19: 70-82
16. Rangaswamy M, Prabhu, Nandni NM, Manjunath GV. Bone marrow examination in pancytopenia. J Indian Med Assoc. 2012 Aug; 110(8):560-2, 566.

Source of Support: None Declared
Conflict of Interest: None Declared