



Original Research Article

Pancytopenia in children-clinical and haematological evaluation

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ABSTRACT

Pancytopenia is characterised by anaemia, leukopenia and thrombocytopenia. The common causes of pancytopenia in children are acute leukemia, nutritional deficiency anaemia, aplastic anaemia, bone marrow suppression (by drugs and various infections etc) and myelophthistic anaemia. Complete examination of the patient along with routine haematological investigation is very important in establishing the various causes of pancytopenia.

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1. Introduction

There is reduction of all three cellular elements of the blood in pancytopenia results in anaemia, leucopenia and thrombocytopenia. The causes of pancytopenia in children varied from transient suppression of the marrow (viral, drug induced and infections), megaloblastic anaemia, marrow aplasia, leukemia to marrow infiltration by malignancy. Presence of pancytopenia serves as valuable clinical clue of some underlying diseases or as a signal to investigate further for bone marrow failure syndrome or suspected haematological malignancy. Clinical history and detailed general and systemic examination of the patient followed by complete haematological investigations are very useful in providing the underline causes of pancytopenia. Although pancytopenia is observed in routine practice in children, yet it has not been studied much in our setup. The data collected helped in planning the diagnostic and therapeutic approach.

2. Aims & Objectives

To study clinical and haematological profile, and to find out various causes of pancytopenia in, paediatric age group.

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3. Material and Methods

Present study was retrospective in nature extending over a period of two years from Jan 2018 to December 2019, conducted in post graduate department of pathology GMC, Jammu. Inclusion criteria include children up to 15 years of age with pancytopenia, who had been admitted to paediatric ward and were referred to department of pathology for laboratory investigations. Pancytopenia is defined as haemoglobin less than 10 gm/dl, absolute neutrophil count less than $1.5 \times 10^9/L$, platelet count less than $100 \times 10^9/L$. Detailed clinical history was taken from the patient regarding nature and duration of illness, loss of weight, whether undergoing any treatment or on any medication. This was followed by detailed general and systemic examination, complete blood count was done on automated cell counters. Detailed peripheral blood film examination was carried out after staining blood film by leishman stain. All patients were subjected to bone marrow examination. Trepchine biopsy was done in cases of hypoplastic marrow. For the diagnosis of nutritional anaemia in children with pancytopenia: serum iron, serum ferritin, Vitamin B12, folic acids levels were done.

4. Results

An inclusion criterion was fulfilled by 68 patients. The age distribution of patients varied over a wide range from 6 months to 15 years. However majority of cases belonged to group of 4 years to 9 years, and the mean age was 6 years. Numbers of males were: 42 and females were: 26, with male to female ratio being 1.6:1, the males outnumbered females in our study.

Table 1: Age distribution of 68 children presenting with pancytopenia.

Age (in Years)	Number of patients	Percentage (%)
0.5-1	4	5.88
1-2	7	10.29
2-3	5	7.35
3-4	4	5.88
4-5	8	11.76
5-6	8	11.76
7-8	6	8.82
8-9	5	7.35
9-10	6	8.82
10-11	3	4.44
11-12	5	7.35
12-13	2	2.94
13-14	3	4.44
14-15	2	2.94

Table 2: Sex distribution of 68 children presenting pancytopenia.

Sex	Number of patients	Percentage (%)
Male	42	61
Female	26	39

Table 3: Clinical presentation of children with pancytopenia

S.No.	Clinical Presentation	No of Patients	Percentage (%)
1	Anaemia	68	100
2	Generalised weakness	50	73.53
3	Fever	62	91.18
4	Bleeding manifestation	15	22.06
5	Hepatosplenomegaly/ lymphadenopathy	60	88.24
6	Drug intake	2	2.94

In our study the common cause of pancytopenia was megaloblastic anaemia seen in 33 (48.53%) children followed by acute leukemia (30.88%), hypoplastic marrow (transient marrow suppression) (8.82%), aplastic anaemia (7.53%), Leishmaniasis (2.94%), marrow infiltration by NHL (1.47%)

Table 4: Various Causes of pancytopenia in our study.

Causes	Number of patients	Percentage
Megaloblastic Anaemia	33	48.53
Acute Leukemia	21	30.88
Hypoplastic Marrow (Transient Marrow Suppression)	6	8.82
Aplastic Anaemia	5	7.35
Leishmaniasis	2	2.94
Marrow Infiltration by NHL	1	1.47

5. Discussion

In study of 68 cases of pancytopenia, clinical examination, investigation like complete blood count, peripheral blood examination, bone marrow aspiration cytology, trephine biopsy and various other relevant investigations were assessed in diagnosing causes of pancytopenia. In our study we included the paediatric patients because there was not much data available in Jammu region and fewer studies are found related to pancytopenia in children. Children whose complete blood count showed pancytopenia were sent to pathology department GMC Jammu for complete investigation. In our study we also observed diagnostic importance of peripheral blood examination, red cell morphology, in establishing various causes of pancytopenia like presence of anisopoikilocytosis, macrovalocytes, howell jolly bodies, cabot ring and hypersegmented polymorphs, few cases were showing circulatory megaloblasts suggestive of megaloblastic anaemia. Normocytic Normochromic anaemia was observed in cases of aplastic anaemia. BN Gayathri et al¹ also observed the importance of RBC morphology in their study. Activated lymphocytes were seen in the PBF of patients having viral infections. In our study the patients diagnosed as acute leukemia on bone marrow, their peripheral blood examination showed aleukemic or sub leukemic blood picture with occasional blast in their peripheral blood smears. We also found the importance of clinical details in cases of hypoplastic marrow. On bone marrow aspiration, smears were hypocellular, there was transient marrow suppression with mild increase in marrow fat. History was elicited in these patients, revealed some herbal medication in one of the patient and in other patient there was history of chemotherapy induced marrow suppression. Other causes of hypoplastic anemia in our study were viral induced bone marrow suppression and haemophagocytic syndrome. Bone marrow aspiration was found to be the most important diagnostic tool in investigating the causes of pancytopenia. Trephine biopsy was done in all cases of hypoplastic marrow. Six patients were diagnosed as hypoplastic anaemia with transient marrow suppression. Follow up was done in these cases showed complete remission with normal blood counts. Five cases were diagnosed as aplastic anaemia, on

trephine biopsy.

V. Gupta et al,² conducted study on clinico haematological profile of children presenting with pancytopenia, also recorded the detailed history, clinical examination and haematological parameters in establishing causes of pancytopenia in children.

Pancytopenia associated with hepatosplenomegaly and lymphadenopathy suggested the possibility of underlying malignant process like acute anaemia. Hepatosplenomegaly was also seen in patients of megaloblastic anaemia. Combining all investigations as mentioned above, the various causes of pancytopenia in our study were megaloblastic anaemia in 33 cases (48.53%), acute leukemia in 21 cases (30.88%), hypoplastic marrow with transient suppression in 6 cases (8.82%), aplastic anaemia in 5 cases (7.35%), kala-azar in 2 cases (2.94%), bone marrow infiltration by NHL in 1 case (1.47%). Megaloblastic anaemia was the most frequent cause seen in 33 cases (48.5%), followed by acute leukemia in 21 cases (30.88%), hypoplastic marrow with transient marrow suppression in 6 cases (8.82%), aplastic anaemia in 5 (7.35%) cases, Leishmaniasis in 2 (2.94%) cases and marrow infiltration by NHL in 1 (1.47%) case.

SK. Bhatnagar et al,³ also observed megaloblastic anaemia as single common etiological factor in there study. Khunger JM et al,⁴ also found the megaloblastic anaemia as the most common cause of pancytopenia in their study. Aplastic anaemia, haematological malignancies and megaloblastic anaemia were the common causes of pancytopenia in children, in study conducted by A Z Jan.⁵ This was in contrast to our study where we found megaloblastic anaemia the first common cause. The possible explanation is prevalence of nutritional deficiency anaemias in our region and patients belonging to poor socio-economic status, who usually come from rural areas to our hospital. Naseem S et al⁶ observed in their study the aplastic anaemia the first common cause of pancytopenia which was followed by acute leukemia and megaloblastic anaemia.

6. Summary and Conclusion

We concluded from our study, the importance of clinical details, complete examination of patients, and complete haematological examination in cases of pancytopenia. Various causes were found in association with pancytopenia among which megaloblastic anaemia was the commonest of all in our study. A frequent interaction between

haematologist, pathologist and clinician is required as this saves time to reach the diagnosis and prevents unnecessary and irrelevant investigations. Causes of pancytopenia may vary in different population group with their difference in age patterns, nutritional status and prevalence of infections.

7. Source of Funding

None.

8. Conflict of Interest

None.

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