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Clinical and etiological profile of children with pancytopenia admitted to tertiary care hospital.

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Abstract

Introduction: To study the Clinical, Hematological and Etiological profile of children in the age group 1 month to 18 years with Pancytopenia admitted at Vani Villas Hospital, Bengaluru.

Materials and Methods: A cross-sectional study on children admitted to Vani Villas Hospital with Pancytopenia between January 2022 to December 2022 were enrolled. Children between the age group 1 month to 18 years, who gave consent for the study were included. An already k own case of Pancytopenia were excluded from the study.

Result: Of the 39 cases enrolled in the study, 22 were Male and 17 were female. Age group most commonly affected was between 10-18 years. Easy fatiguability (63.1%) followed by fever (26.3%) were the most common complaints and pallor (100%) followed by icterus (31.6%) and splenomegaly (26.3%) each were the common physical findings seen. Among them, 20 patients underwent bone marrow examination of which 10 patients had Hypocellular bone marrow, the most common cause being aplastic anemia and 10 patients had hypercellular bone marrow, the most common cause being acute Leukemia. Most common etiology in our study was megaloblastic anemia (21%), aplastic anemia (15.7%) and Acute Leukemia (13.2%).

Conclusion: Megaloblastic anemia is the most common cause for pancytopenia followed by aplastic anemia and acute Leukemia.

Keywords: Pancytopenia, Anemia, Leukemia, Hepatosplenomegaly.

Introduction

Leukocytes, platelets, and erythrocytes are the three lineages of peripheral blood that are reduced below normal levels in pancytopenia[1]. Although pancytopenia is a prevalent Haematological condition with a wide range of differential diagnoses, still the optimal diagnostic approach to pancytopenia remains undefined [2].

Etiology of Pancytopenia may result from hereditary or acquired factors. Fanconi anemia, Schawman Diamond Syndrome, Dyskeratosis Congenita, Congenital A megakaryocytic Thrombocytopenia, Reticular Dysgenesis, and other genetic diseases may all contribute to inherited pancytopenia.

Radiation, medications, chemicals, viruses, immune-mediated conditions, paroxysmal nocturnal hemoglobin Uria, and bone marrow repla cement are examples of acquired causes[3]. Megaloblastic anaemia has been recognised as a distinct clinical entity for more than a century; Thomas Addison is credited with presenting the first clinical instance of pernicious anaemia, one of the known causes of megaloblastic anaemia, in 1849[4].

Clinical manifestations of the illness that causes bone marrow suppression in children include fever, pallor, mucocutaneous bleeding, hepatosplenomegaly, and lymphadeno pathy[5].

As many cases of pancytopenia in children are curable, including those caused by malaria,

enteric fever, sepsis, and certain cancers (ALL)[6];

early therapy initiation and complication prevention necessitate a timely diagnosis based on suspected clinical features[7]. For a proper diagnosis, a thorough medical history, physical examination, complete blood counts with reticulocyte counts, and peripheral blood smear are required[8]. If this didn't reveal the cause bone marrow aspiration or biopsy is needed[7]. In cases of pancytopenia, it is advised that a bone marrow aspiration and biopsy be performed simultaneously.

While biopsy offers a more trustworthy estimate of cellularity, exposes bone marrow infiltration, fibrosis, and granulomas; while marrow aspiration smears are better for morphological details[9]. In situations of pancytopenia, the marrow cellularity and composition vary depending on the underlying clinical condition. When a primary production deficiency is the source of pancytopenia, the marrow is typically hypocellular. A normocellular or hypercellular marrow is typically linked to pancytopenia due to ineffective hematopoiesis, increased peripheral cell utilisation or destruction, and bone marrow invasive processes[10].

Materials & methods

This was a cross-sectional study conducted at department of Pediatrics, Bangalore Medical College and Research Institute, Bangalore from January 2022 to December 2022. All the children who met the Inclusion Criteria were enrolled for the study.

Inclusion Criteria

- Children between the age group 1month to 18 years.
- Having blood investigation report of Hemoglobin, Total Counts and Platelets below the age-appropriate cut offs.
- Gave informed consent

Exclusion Criteria

- Children who did not meet the age criteria
- Already a diagnosed case of pancytopenia
- History of blood transfusion in the previous 3 months
- Not given consent

Patients were subjected to detailed history and clinical examination. Investigations included Complete blood count, peripheral smear, reticulocyte count, iron, ferritin, Vitamin B12 and folic acid levels. If diagnosis could not be established, bone marrow aspiration with biopsy was done.

Result

During the study period 39 patients aged between 1 month to 18 years were enrolled. They consisted of 22 Males and 17 Females in the ratio 1.6:1(Table 1). Among the age group category maximum number of

patients 17(43.6%) were in the age group 10 to 18 years followed by 14(35.9%) in the age group 5-10 years, 6(15.4%) in the age group 1-5 years and 2(5.1%) in the age group 1month to 1 year; all the groups having Male preponderance.

Table 1: Age and Gender wise distribution of patients in the study

Age	Male	Female	Total
1 month to 1 year	0	2	2(5.1%)
1 to 5 years	4	2	6(15.4%)
5 to 10 years	9	5	14(35.9%)
10 to 18 years	9	8	17(43.6%)
Total	22(56.4 %)	17(43.5%)	39

The most common presenting complaint in our current study was Easy fatiguability (63.1%), followed by Fever (26.3%), Pain Abdomen (23.6%), Bleeding Mani festations (21%), Loss of Appetite (15.7%), Failure to gain weight/Weight loss (7.9%), Irritability (5.2%) and Joint Pain (5.2%) (Table 2). Among the physical findings, pallor was present in all the patients (100%), followed by Icterus (31.6%), Splenomegaly (26.3%), Hepa to megaly (21%), Rash (15.8%), Knuckle hyper pig mentation (10.5%), Lymphadenopathy (10.5%), Edema (5.2%) and Oral ulcers (5.2%) (Table 3).

Table 2: Presenting Complaints of the Patients

Presenting Complaint	Number
Easy Fatigue	24(63.1%)
Fever	10(26.3%)
Pain Abdomen	9(23.6%)
Bleeding Manifestations	8(21%)
Loss of Appetite	6(15.7%)
Failure to gain weight Weight Loss	3(7.9%)
Irritability	2(5.2%)
Joint Pain	2(5.2%)

Table 3: Examination findings of the Patients

Physical Examination	Number
Pallor	39(100%)
Icterus	12(31.6%)
Splenomegaly	10(26.3%)
Hepatomegaly	8(21%)
Rash	6(15.8%)
Knuckle hyperpigmentation	4(10.5%)
Lymphadenopathy	4(10.5%)
Edema	2(5.2%)
Oral ulcers	2(5.2%)

Bone Marrow Examination was done for those patients in whom Etiology could not be made out by routine investigations. Of the 15 patients who underwent bone marrow examination, 10 patients had Hypo cellular Marrow (50%) and 10 patients had hypercellular marrow (50%). Most common cause for Hypocellular Marrow was aplastic anemia (30%), followed by Fanconi Anemia (10%), Infection induces bone marrow sup pression (5%) and Paroxysmal Nocturnal Hemo globin Uria (5%). Most common cause for Hypercellular Mar row was Acute Leukemia (30%), followed by Megalo blastic Anemia (10%) and Auto Immune Hemolytic Anemia (10%).

Table 4:

Bone Marrow Findings	Number(n=20)
Hypocellular	
Aplastic Anemia	6(30%)
Fanconi anemia	2(10%)
Infection	1(5%)
PNH	1(5%)
Hypercellular	
Acute Leukemia	6(30%)
Megaloblastic Anemia	2(10%)
AIHA	2(10%)

Figure 1: Patients with Hypocellular Marrow.

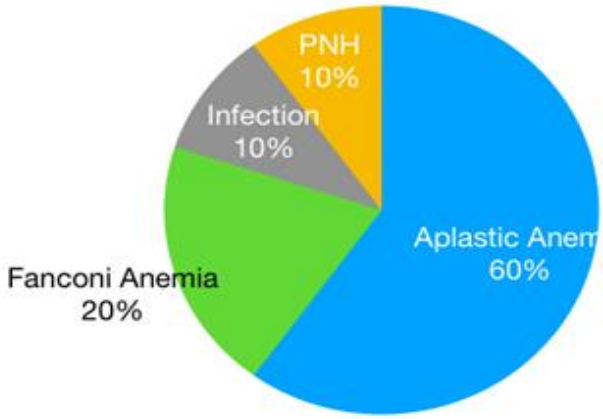
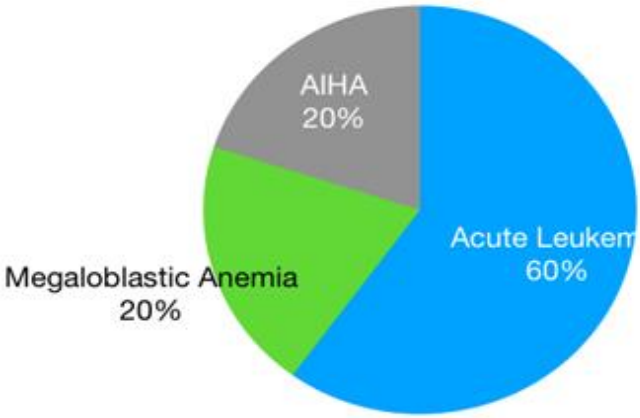


Figure 2: Patients with Hypercellular Marrow



Three Most common condition causing pancytopenia were Megaloblastic Anemia (21%), Aplastic anemia (15.7%) and Acute Leukemia (13.2%) in our study. Other causes are as shown in the table 5.

Table 5:

Diagnosis	Total(n=39)
Megaloblastic Anemia	8(21%)
Aplastic Anemia	6(15.7%)
ALL	5(13.2%)
SLE	3(7.9%)
Rickettsial Infection	3(7.9%)
Dengue	3(7.9%)
Infantile Tremor Syndrome	3(7.9%)
Auto Immune Hemolytic Anemia	2(5.2%)
Fanconi Anemia	2(5.2%)
Paroxysmal Nocturnal Hemoglobinuria	2(5.2%)
Hypersplenism	1(2.6%)
AML	1(2.6%)

Discussion

Pancytopenia itself is not a disease but actually a triad of findings that may result from a number of disease processes associated with bone marrow both affecting it primarily or secondarily and resulting in pancytopenia[11]. The frequency of pattern of disease varies in different population groups and has been attributed to differences in nutritional status, prevalence of infections and varying exposure to myelotoxicdrugs[12]. Though many studies regarding pancytopenia in children have been conducted across the globe, limited literature exists regarding spectrum of pancytopenia in children from South India.

In our present study a total of 39 cases of pancytopenia got admitted. Incidence, age-gender wise distribution, clinical presentation, bone marrow study and etiological profile were studied.

Out of 2550 admissions between the month of January 2022 to December 2022, 39 cases of them were Pancytopenia. In our study the incidence was 1.5%. This frequency in other studies is variable. Tilak et al found the incidence to be 374 per million hospital attendance per year[13]. While the study conducted by Chand R et al reported it to be 3.04%[14].

In our study, the incidence of pancytopenia was more among males as compared to females among all the age group, with ratio of 1.6:1. Similar results of higher incidence among males were found in other studies by Amie Leena C, et al and Goel RG, et al reported the male to female ratio of 1.64:1 and 1.76:1 respecti vely[15,16].

In the present study the most common presenting complaint was Easy Fatiguability (63.1%) followed by fever (26.3%). All the patients had pallor (100%), followed by icterus (31.6%), splenomegaly (26.3%) and hepatomegaly (21%). In the study conducted by Bhat Nagar et al, the most common symptoms were weakness (97.8%), and breath lessness

(75%), and signs were pallor (98.3%) and splenomegaly [17]. Whereas Fever and bleeding were the most common presenting complain in children studied by Gupta et al. And Bhatnagar et al. respectively[12,17]. Hepatomegaly (66%) and splenomegaly (21%)

were seen in the study done by Gomber et al[18].The most common clinical finding in pancytopenia patient was pallor amongst various studies.

Bone marrow examination revealed Hypocellular marrow in 50% of the patients and Hypercellular mar row in other 50% of cases. Most common cause for Hypo cellular Marrow was aplastic anemia (30%) and Hypercellular marrow was Acute Leukemia (30%). In the study conducted by Maru et al, 66% of the cases had hypercellular marrow, 7% of the cases had Hypocellular marrow and 12% of the cases had normocellular marrow (19%) [19]. In another study conducted by Chand et al, most common cause for Hypercellular marrow was Megaloblastic anemia (19%) and most common cause for Hypocellular marrow was Aplastic Anemia (9%) (14%).

Of the 39 patients enrolled for the study; megaloblastic anemia (21%), aplastic anemia (15.7%) and acute leukemia (13.2%) were the common causes for pancytopenia. By a study conducted by Zeb Jan et al, Aplastic anemia 58 (28.3%) was the most common cause of pancytopenia followed by leukemia 49 (23.9%) while megaloblastic anemia was found in 40 (19.51%) of cases followed by other less common problems like idiopathic throm Bo cytopenic purpura 16 (7.80%), iron deficiency anemia 9 (4.4%), Visceral leishmaniasis 6 (2.93%), anemia of chronic disorder 4 (1.95%) and malaria was found in 5 (2.44%) of cases.

Conclusion

Pancytopenia is not an uncommon Haematological problem encountered in children. In this study megaloblastic anemia was the most common cause for pancytopenia. Early identification of the underlying conditions would help in understanding the disease process, and early planning for further investigations and management will enhance survival rate of a case with pancytopenia.

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