Hematological Profile Of Patients Of Pancytopenia

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Abstracts: **Background & objectives:** To study the clinical presentation and etiological factors in various cases of pancytopenia and to study and correlate the hematological parameters including bone marrow aspiration and biopsy findings with clinical features. **Material and Methods:** The study was conducted in 100 patients admitted with clinical features of pancytopenia confirmed with hematological findings. Complete hemogram was done with peripheral smear examination and bone marrow aspiration and biopsy as and when required. **Results :** Total 100 patients who presented with pancytopenia were studied. Megaloblastic anaemia was the commonest cause constituting 28% of the cases followed by Iron deficiency anaemia(23%). **Conclusion:** Pancytopenia should be suspected on clinical grounds when a patient presents with unexplained anaemia, prolonged fever and a tendency to bleed.Megaloblastic anaemia is the commonest cause and other common causes are Iron deficiency anaemia and nutritional anaemia.[Shah S et al NJIRM 2014; 5(2) :10-14]

Key Words: pancytopenia, hemogram, anaemia

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Introduction: Cytopenia is a disorder in which production of one or more blood cell types ceases or is greatly reduced than normal levels.[1]Pancytopenia is a disorder in which all three major formed elements of blood(red blood cells, white blood cells and platelets) are decreased than normal levels.[2] The presenting symptoms like weakness, fatigue, dyspnoea, fever, bleeding manifestations are usually attributable to the presence of anaemia, leucopenia and thrombocytopenia.[3]The underlying mechanisms of pancytopenia are decrease in hematopoietic cell production, marrow replacement by abnormal cells, suppression of marrow growth and differentiation, ineffective erythropoiesis and defective cell formation.[5]

Careful assessment of the blood elements is often the first step in assessment of hematologic function and diagnosis of the disease. Bone marrow evaluation is an invaluable diagnostic procedure in practice of medicine which may confirm the diagnosis of suspected pancytopenia or occasionally give a previously unsuspected diagnosis. Megaloblastic anaemia and other nutritional anaemias are easily preventable and treatable so it is very important to identify and treat these conditions.

Material and Methods: The present study was conducted on 100 patients admitted to the hospital of all age groups and with hematological diagnosis of pancytopenia with consent of patients & permission of IRB. The cases were selected on the basis of clinical features confirmed with hematological findings and bone marrow aspiration and biopsy as and when required. Complete hemogram was done which included following investigations.

- Hb-Hemoglobin
- RBC Count-Red blood cell count
- WBC Count-White blood cell-total and differential count
- Platelet count
- Reticulocyte count
- Blood indices and peripheral smear examination

The investigations were done on cell counter .Manual methods were used whenever required.
Bone marrow aspiration and biopsy were done as and when required using Salah needle and standard histological technique.

Result: Total 100 patients who presented with pancytopenia were studied. Table 1 describes causes of pancytopenia, Table 2 & 3 describe clinical presentation of the cases, Table 4 & 5 describes hematological parameters & peripheral blood picture in pancytopenia patients, Table 6 & 7 describe comparision of clinical features in pancytopenia in various studies, Table 8 describes comparision of causes of pancytopenia in various studies.

Table: 1: Divisions Of Various Causes Of Pancytopenia

Serial No.	Causes	No Of Cases	Percentage (%)
1	Aplastic Anemia	2	2
2	Acute Leukemia	5	5
3	Cirrhosis Of Liver	1	1
4	Dimorphic Anemia	3	3
5	Dengue	1	1
6	Hepatitis A	1	1
7	Hypocellular Marrow	9	9
8	Iron Deficiency Anemia	23	23
9	Idiopathic Thrombocytic Purpura	2	2
10	Megaloblastic Anemia	28	28
11	Malaria	1	1
12	Metastatic Malignancy	1	1
13	Nutritional Anemia	13	13
14	Normal	4	4
15	Paroxysmal Nocturnal Hemoglobinuria	1	1
16	Pulmonary Tuberculosis	3	3
17	Typhoid	2	2
	Total	100	100

Table:2: Age-Wise And Sex-Wise Distribution Among 100 Patients, Under The Present Study

Serial no	Age Groups (Years)	Male	Female	No. of cases	Percentage(%)
1	0--10	11	13	24	24
2	11--20	13	8	21	21
3	21—30	7	4	11	11
4	31—40	2	7	9	9
5	41—50	4	10	14	14
6	51—60	4	7	11	11
7	61—70	4	2	6	6
8	71—80	2	1	3	3
9	81—90	0	1	1	1
	Total	47	53	100	100

Pancytopenia showed its highest incidence in the age group of 0-10 years and its occurrence was less frequent in the age group of 81-90 year. The incidence of Pancytopenia shows slight female preponderance.Female to male rario was 1.2:1.

Table:3: Presenting Complaints And Physical Findings In Pancytopenia

Sr. No	Presenting complaints and physical finding	No. of patients	Percentage (%)
1	Generalized Weakness	57	57
2	Fever	55	55
3	Dyspnoea	23	23
4	Bleeding Manifestations	17	17
5	Pallor	100	100
6	Hepatomegaly	21	21
7	Splenomegaly	40	40
8	Lymphadenopathy	3	3

The commonest mode of presentation was generalized weakness(57%).The other main symptoms were fever(55%) and dyspnoea(23%). Pallor was noted in all cases. Splenomegaly (40%), hepatomegaly (21%) was seen in cases of megaloblastic anaemia, subleukemic leukemia and malaria. Lymphadenopathy constituting 3% was noted in subleukemic leukemia.

Table:4: Vital Haematological Parameters In Cases Of Pancytopenia

Serial No	Parameter	Range	No. of cases	%
1	Hemoglobin (gm%)	1.8-4	32	32
		4.1-7	52	52
		7.1-9	16	16
Total			100	100
2	Total leucocyte count (cells/mm^3)	< 1000	9	9
		1001-2500	26	26
		2501-4000	65	65
Total			100	100
3	Total Platelet count (cells/mm^3)	<50000	51	51
		51000-1,00,000	33	33
		1,00,000-1,50,000	16	16
Total				100

Haemoglobin percentage varied from 1.8-9.0gm%.Most of the patients had Hb percentage between 4.1-7 gm%.Lowest value of 1.8gm% was seen in a case of iron deficiency anaemia.Total leukocyte count ranged from 786-4000 cells/cmm.Most of the patients had WBC count in the range of 2501-4000 cells/cmm.Lowest count of 786 cells /cmm was seen in a cases of Iron deficiency anaemia.

Table:5:Peripheral Blood Picture In Pancytopenic Patients

Serial no	Blood picture	No. of cases	Percentage(%)
1	Normocytic Normochromic	25	25
2	Microcytic Hypochromic	26	26
3	Macrocytic	33	33
4	Dimorphic	16	16
	Total	100	100

Bone marrow aspirations in present study of Pancytopenia showed three distinct types of cellularity-hypercellularity, hypocellularity and normocellularity. Pancytopenia with hypercellular marrow was observed in 61 patients. Megaloblastic anaemia was seen in 28% cases of Pancytopenia and 41% of total cases of Pancytopenia with hypercellular marrow. In the cases of Megaloblastic anaemia male to female ratio was 1.3:1.The age incidence was from 6 months to 75 years. Its highest incidence was between 11-20 years. Hb percentage showed variation from 1.8-9 gm%. WBC count ranged from982-4000 cells/cmm. The platelet count varied from 5000-1,50,000 cells/cmm.

In the present study 23 patients presented with iron deficiency anaemia in the age group of 7 months to 75 years.Among these 11 were males and 12 were females.Hb was in the range of 1.8 to 6.5 gm%.Total leucocyte count was in the range of 786-4000/cmm.Platelet count was in the range of 3000-1,50,000/cmm.The peripheral blood picture showed microcytic hypochromic anaemia.

Discussion: Statistical data of age, sex, presenting complaints, various causes of cytopenias, peripheral smear and bone marrow aspiration/biopsy were studied and compared with the findings in other studies.

Table:6: Age, Sex Distribution Compared To Other Studies Of Pancytopenia

Sr. No	Authors	No of cases	M:F	Age range
1	Khunger JM et al[7] (2002)	200	1.2:1	2-70 years
2	Kumar R et al[4] (2001)	166	2.1:1	12-73 years
3	Khodke K et al[5] (2001)	50	1.3:1	3-69 years
4	Tilak V et al[6] (1999)	77	1.14:1	5-70 years
5	Present study	100	1:1.2	6 months-82 years

Age and sex distribution in our study was comparable with other studies of Pancytopenia.

Table:7: Physical Findings Compared To Other Studies

	Spleno megaly	Hepato megaly	Lymphadenopathy
Khunger JM et al[7] study	64	63	10
Tilak V et al[6] study	32	29	6
Present study	40	21	3

The presenting symptoms were usually attributed to anaemia or thrombocytopenia. Leucopenia was an uncommon causes of the initial presentation of the patient but can become the most serious threat to life during the course of the disorder. Physical findings were comparable with other studies.

Table:8: Various Causes Of Pancytopenia Compared To Other Studies

Causes	Khunger JM et al[7] (2002)	Kumar R et al[4] (2001)	Khodke et al[5] (2001)	Tilak V et al[6] (1999)	Present study
Aplastic anemia	28	49	7	6	2
Megaloblastic anemia	144	37	22	53	28
Subleukemic leukemia	10	20	1	1	5

Lymphoma	2	10	-	2	-
Myelodysplastic syndrome	4	6	1	-	-
Marrow metastasis	-	2	-	-	1
Myelofibrosis	2	2	-	1	-
Malaria	2	5	-	3	1
Enteric fever	-	2	-	-	2
Maliganat histiocytosis	-	1	-	-	-
Disseminated Tuberculosis	1	1	1	1	3
Multiple myeloma	2	-	2	1	-
Waldenstrom's macroglobulinemia	1	-	-	1	-
Acquired immuno-deficiency syndrome	-	-	1	-	-
Storage disorder	-	-	-	-	-
Iron deficiency anemia	-	-	-	-	23
Dimorphic anemia	-	-	-	-	3
Nutritional anemia	-	-	-	-	13
Dengue	-	-	-	-	1
Chronic liver disease	-	-	-	-	2
Hypocellular marrow	-	-	-	-	9
Immune thrombocytopenic purpura	-	-	-	-	2
Normal marrow	-	-	-	-	4
Paroxysmal nocturnal hemoglobinuria	-	-	-	-	1

The variations in the frequency of various diagnostic entities causing Pancytopenia have been attributed to the difference in methodology and stringency of diagnostic criteria,geographic area,period of observation,genetic differences and varying exposure to myelotoxic agents.The commonest causes of Pancytopenia reported from various studies throughout the world has been aplastic anaemia which is with sharp contrast to the results of our study and other studies conducted in India.This seems to reflect the higher prevalence of nutritional anaemia in Indian subjects.

The incidence of megaloblastic anaemia varied from 0.8 to 32.26% of all pancytopenic patirents.The incidence in our study was 28%.Khunger JM et al[7] reported 72% incidence and Tilak V et al[6]reported 68% incidence.

Bone marrow aspiration in megaloblastic anaemia showed erythroid hyperplasia. Megaloblasts had sieved nuclear chromatin, asynchronous nuclear maturation and cytoplasmic blebs. Giant metamyelocytes and band forms were predominant in leucocytic series.

Incidence of aplastic anaemia varied from 10 to 52% among pancytopenic patients.Our incidence of hypoplastic anaemia was 9 and aplastic anaemia was 2% which is correlated with the studies by Khodke K et al[5]and Khunger JM et al[7](74%).A higher incidence of 29.5% was reported by Kumar et al[4].

Marrow aspirates were hypocellular with fragments composed of fat. Normoblastic erythropoiesis was seen with normal M:E ratio and mild increase in lymphocytes and plasma cells.The incidence of aplastic anaemia quoted from the west is much higher than that observed by us which can be due to environmental factor such as increased exposure to toxic chemicals. We encountered 23 cases of iron deficiency anaemia and 13 cases of nutritional anaemia which is sharp contrast with other studies. In our study the peripheral smear examination of the patients with iron deficiency anaemia showed Microcytic hypochromic anaemia in almost all cases & bone marrow aspiration showed hypercellularity in most cases with micronormoblastic maturition.

Conclusion: Pancytopenia is not an uncommon problem encountered in clinical practice. The physical findings and peripheral blood picture provides valuable information in the work of cytopenic patients. Evaluation of peripheral blood film reveals the most probable cause of anaemia. Bone marrow aspiration is an important diagnostic tool in haematology which helps to evaluate causes of Pancytopenia.Megaloblastic anaemia was the commonest cause and other common causes were iron deficiency anaemia and nutritional anaemia.

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