



Original Article

Clinico-Haematological Analysis of Pancytopenia in Adults

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Abstract

Background: Pancytopenia is a relatively common hematological entity. It is a striking feature of many serious and life threatening illnesses. The severity of pancytopenia and the underlying pathology determine the management & prognosis. Thus identification of etiology will help for better management of patient.

Objectives

1. To find out the underlying etiopathology of pancytopenia.
2. To study the clinical presentations in pancytopenia due to various causes.
3. To evaluate hematological parameters including bone marrow morphology in pancytopenia.

Methods: This study was a cross sectional study that was conducted at department of Pathology, Dr.Bhauasaheb Sardesai Talegaon Rural Hospital from Jan 2010 to June 2014. One hundred pancytopenia patients were evaluated clinically, along with hematological parameters and bone marrow aspiration.

Results: Among 100 cases studied, maximum number of cases were in the age group of 21-30 years (32%) with a male predominance (64%). Most patients presented with generalized weakness. The commonest physical finding was pallor followed by splenomegaly and hepatomegaly. Dimorphic anemia (46%) was the predominant blood picture followed by macrocytic anemia. The commonest bone marrow finding was megaloblastic erythroid hyperplasia. The commonest cause for pancytopenia was megaloblastic anemia (78%), followed by aplastic anemia (12%). Other causes of pancytopenia were hypersplenism, subleukemic leukemia, multiple myeloma and leishmaniasis.

Conclusion: The commonest cause of pancytopenia in our study and studies done in India is megaloblastic anemia. The present study concludes that detailed primary hematological investigation along with bone marrow aspiration in pancytopenic patients helps to determine the cause of pancytopenia, which is important for planning further investigation and management.

Keywords: Bone marrow aspiration, megaloblastic anemia, pancytopenia.

INTRODUCTION

Pancytopenia is defined as reduction of all three formed blood elements below the normal range that is simultaneous presence of anemia, leucopenia and thrombocytopenia.¹ Pancytopenia exists in adults when haemoglobin is < 13.5 gm/dl in male and < 11.5 gm/dl in female, WBC count < $4 \times 10^9/L$ and platelet < $150 \times 10^9/L$.^{1,2}

The frequency of various diagnostic entities causing pancytopenia has been attributed to differences in the methodology and stringency of diagnostic criteria, geographical difference and underlying exposure to myelotoxic drugs.³ The severity of pancytopenia and the underlying pathology determines the management and prognosis of the disease.^{4,5,6}

Hence the finding of correct etiopathology in a given case is crucial.

Peripheral pancytopenia is a manifestation of disorders which primarily or secondarily affect the bone marrow.^{1,2,4} Hence, bone marrow examination is extremely helpful in evaluation of pancytopenia.⁷

OBJECTIVES

1. To find out the underlying etiopathology of pancytopenis.
2. To study the clinical presentations in pancytopenia due to various causes.
3. To evaluate hematological parameters including bone marrow morphology in pancytopenia.

METHODS

The present study was conducted in department of Pathology, BSTRH from Jan 2010 to June 2014. Case selection was based on clinical features & supported by laboratory evidences which included hemoglobin, leucocyte & platelet count, peripheral blood smear and bone marrow aspiration examination.

After informed consent of patients or the guardian, bone marrow aspiration was done with Salah needle from posterior superior iliac spine or sternum and bone marrow trephine biopsy was

done with Jamshidi needle from posterior superior iliac spine.

SELECTION OF CASES

Inclusion criteria -

Patients of age greater than or equal to 12 years admitted in BSTRH with a haematological diagnosis of pancytopenia followed by bone marrow aspiration or biopsy were included in this study.

The criteria applied for pancytopenia were -

- Hb < 13.5 gm/dl in males and < 11.5 gm/dl in female,
- WBC count < $4 \times 10^9/L$
- Platelet < $150 \times 10^9/L$

Exclusion criteria –

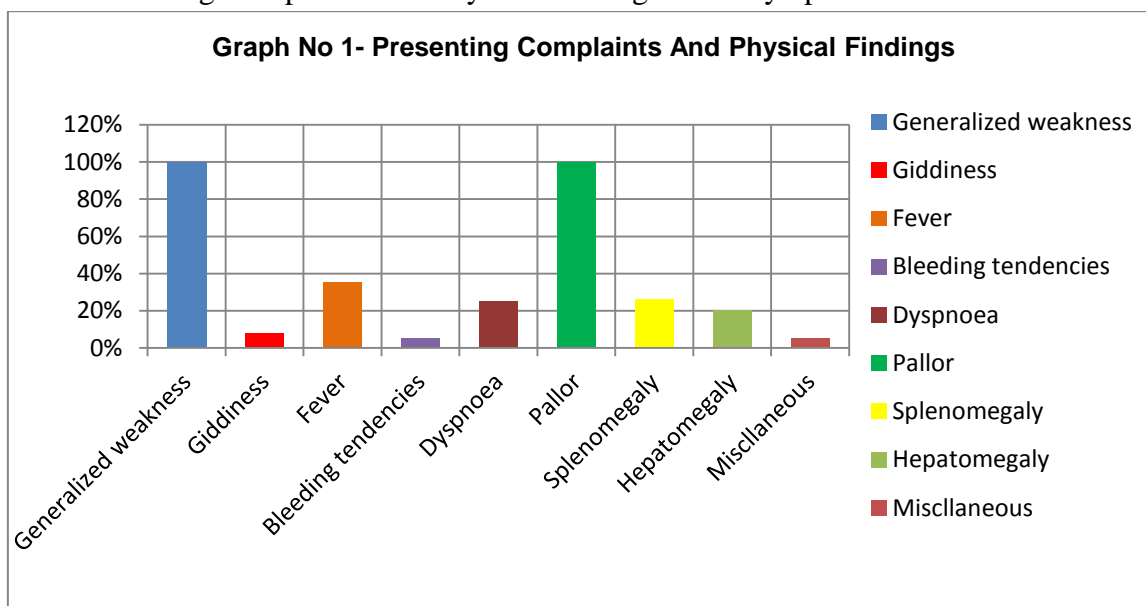
- Patients < 12 years will be excluded
- Patients who showed malarial parasite on peripheral smear were excluded.
- Patients on myelotoxic chemotherapy.

RESULTS

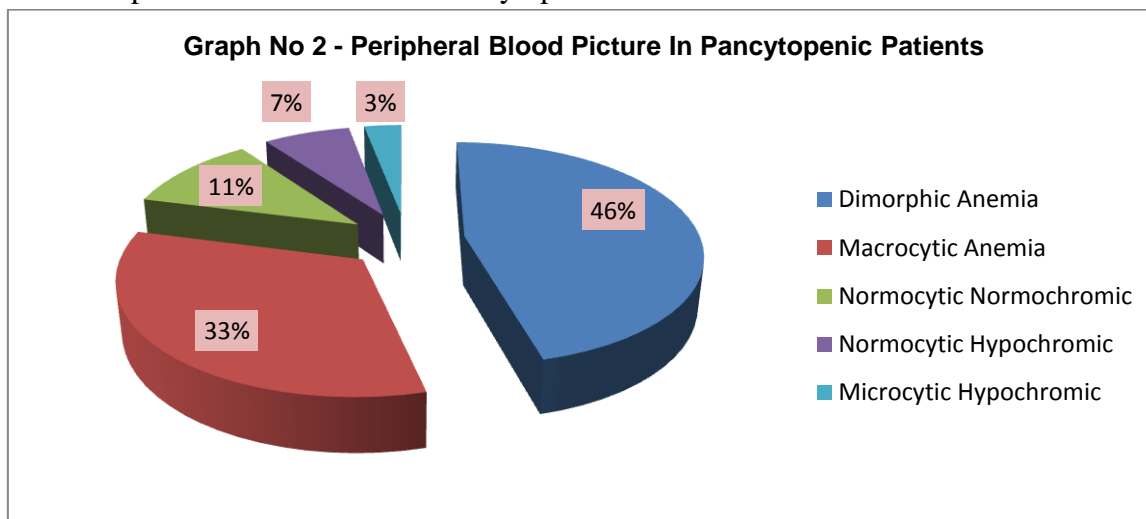
Among 100 cases studied, age of patients ranged from 12 to 80 years with maximum number of cases in the age group of 21-30 years (32%) and male predominance with male to female ratio 1.7:1. Most of the patients presented with generalized weakness (100%) and fever (35%). The commonest physical finding was pallor (100%), followed by splenomegaly (26%) and hepatomegaly (20%). Dimorphic anemia was the predominant blood picture followed by macrocytic anemia (33%). The commonest Bone marrow aspiration / biopsy finding was hypercellularity with megaloblastic erythropoiesis. The commonest cause for pancytopenia was megaloblastic anemia (78%), followed by aplastic anemia (12%).

The commonest cause of pancytopenia was megaloblastic anemia seen in 78 patients followed by aplastic anemia in 12 patients. The other causes of pancytopenia were subleukemic leukemia, hypersplenism, multiple myeloma and leishmaniasis

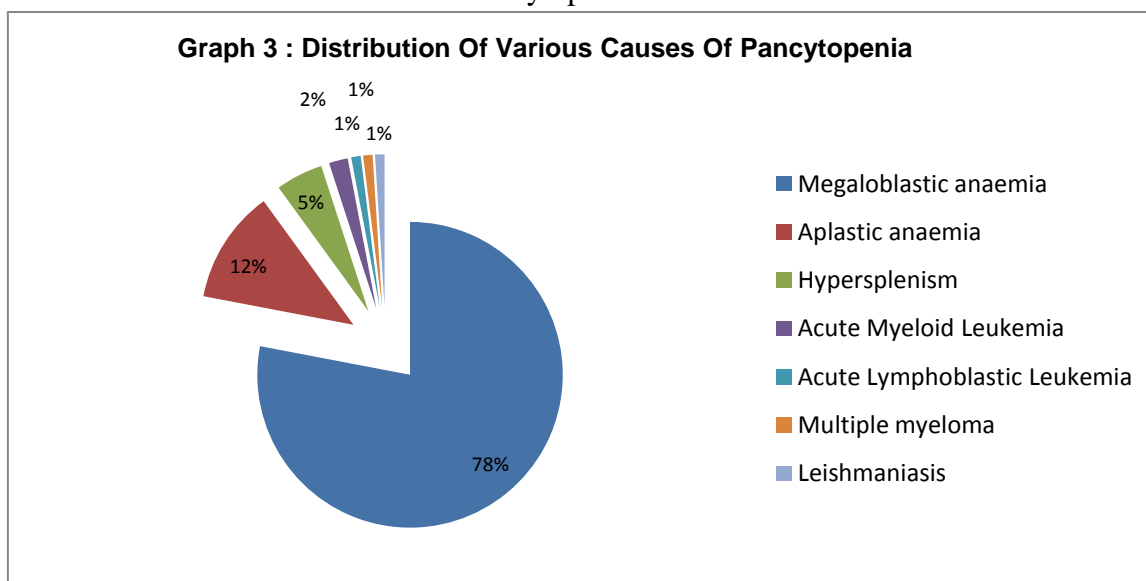
Graph No 1 – Presenting Complaints and Physical Findings in Pancytopenia



Graph No 2 – Peripheral Blood Picture in Pancytopenic Patients



Graph No 3 - Distribution of Total Cases of Pancytopenia



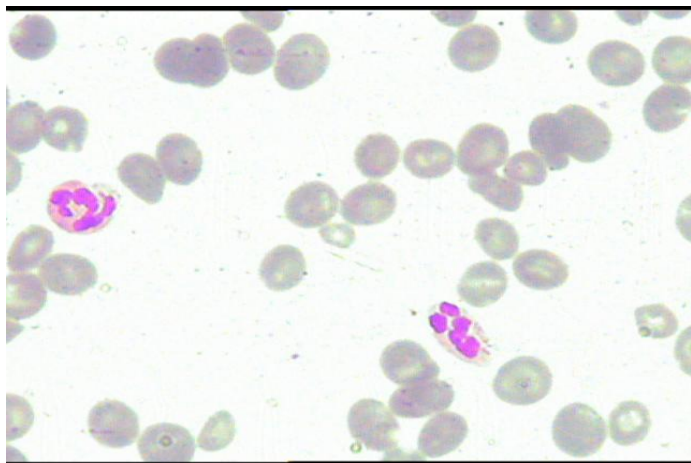


Fig 1: Megaloblastic anemia. Peripheral smear showing hypersegmented neutrophils and macrocytes. (Leishman's stain – 10x X 100x)

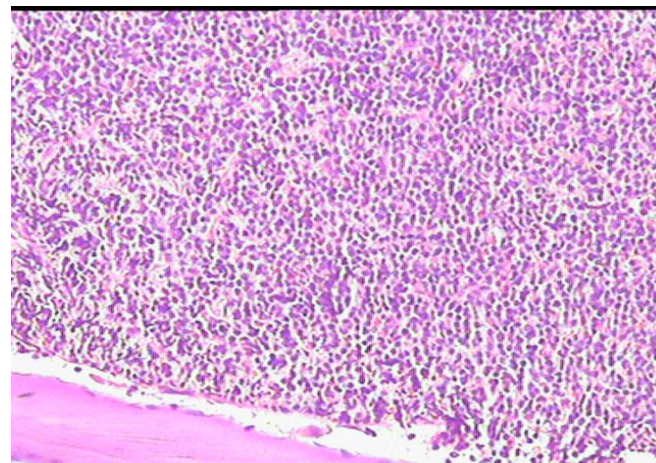


Fig 4: ALL. Bone marrow trephine biopsy showing hypercellular marrow with increased blasts (H&E Stain 10x X 40x.)

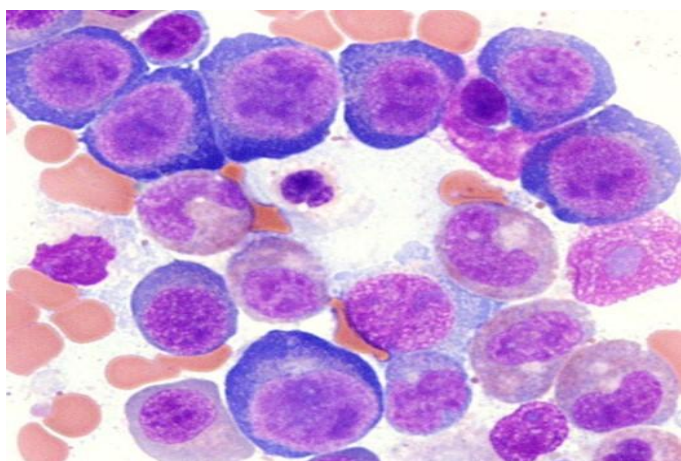


Fig 2: Megaloblastic anemia. Bone marrow aspiration smear showing megaloblasts with open chromatin with giant metamyelocyte. (Leishman's stain–10xX100x)

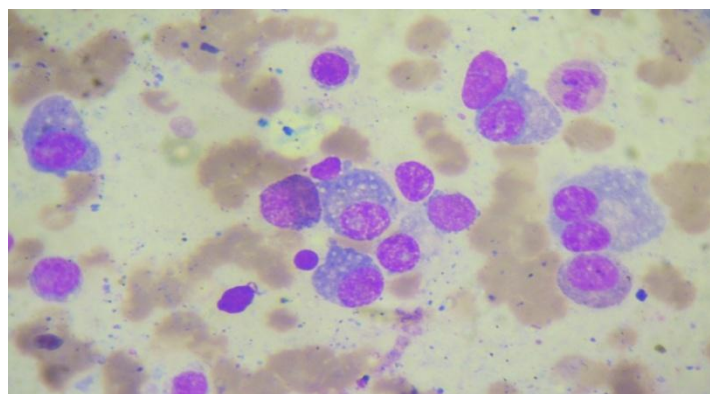


Fig 5: Multiple Myeloma. Bone marrow aspiration smear showing increase in plasma cells. (Leishman's stain–10xX100x)



Fig 3: Aplastic anemia. Bone marrow trephine biopsy showing increase in fat cells.(H&E stain – 10x X 40x)

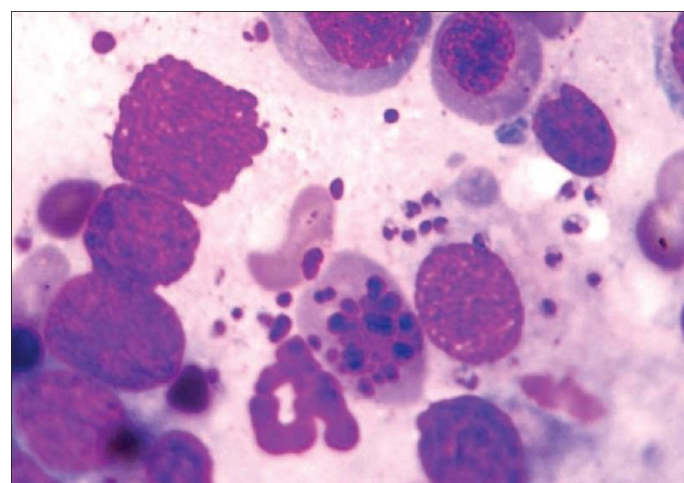


Fig 6 : Leishmaniasis. Bone marrow aspirate showing extracellular L. Donovan bodies. (Leishman's stain – 10x X 100x)

DISCUSSION

Statistical data of age, sex, presenting complaints, various causes of pancytopenia, peripheral smear

and bone marrow aspiration smears or biopsy were studied, and compared with those published in the literature.

Table No 1: Age, Sex Distribution Compared to Other Studies

| | Authors | No. of cases | Age range | M : F |
|---|---|--------------|--------------|----------|
| 1 | Tilak V et al (1999) ⁴ | 77 | 5-70 years | 1.14 : 1 |
| 2 | Kumar R et al (2001) ⁸ | 166 | 12-73 years | 2.1 : 1 |
| 3 | Khodke K et al (2001) ⁵ | 50 | 3 – 69 years | 1.3 : 1 |
| 4 | Khunger JM et al (2002) ² | 200 | 2-70 years | 1.2 : 1 |
| 5 | Jha A et al (2008) ⁷ | 148 | 1-79 years | 1.5 : 1 |
| 6 | Al-Khalisi KA et al (2011) ⁹ | 104 | 15-75 years | 1.3:1 |
| 7 | Hirachand S et al (2013) ¹⁰ | 52 | 12-82 years | 1.2:1 |
| 8 | Present study | 100 | 12-80 years | 1.7:1 |

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

PRESENTING COMPLAINTS AND CLINICAL FINDINGS IN PANCYTOPENIA

In present study, the commonest, mode of presentation was generalised weakness (100%) followed by fever (35.18%), dyspnoea (23.19%), Giddiness (8.33%), bleeding manifestation (8.33%), weight loss (7.41%) and abdominal pain (7.41%).

In another study by Niazi M et al (2004)¹¹ generalized weakness (68.2%) was the commonest symptom, followed by fever (47.7%) and bleeding manifestations (33.7%). In a study by Gayathri and Rao et al. (2011)⁶ generalised weakness (100%) was the commonest symptom, followed by dyspnoea (43.26%). In the study by Kumar DB et al. (2012)⁸ generalized weakness (70.83%) was the most common symptom followed by fever (6.25%) and bleeding manifestations (6.25%). In the study by Thakkar BB et al (2013)¹² generalised weakness (97%) was the commonest symptom, followed by fever (70%), weight loss (38%) and dyspnoea (32%).

In present study the most common clinical finding was pallor (100%) followed by splenomegaly

(25%), hepatomegaly (19.44%), petechiae (6.48%), icterus (5.56%), pedal oedema (4.63%), bony tenderness (0.93%) and lymphadenopathy (0.93%).

In the study by Khodke K et al (2001)⁵ pallor was universally present in all the patients followed by splenomegaly (40%), hepatomegaly (38%) and petechial haemorrhages (28%). In another study by Niazi M et al (2004)¹¹, the most common physical finding was pallor (98.8%) followed by hepatomegaly (32.5%), splenomegaly (24.7%) and petechiae (20.2%). In the study by Gayathri and Rao et al (2011)⁶, the most common physical finding was pallor (100%) followed by splenomegaly (35.57%) and hepatomegaly (26.92%). In the study by Kumar DB et al (2012)⁸, pallor (45.83%) was the predominant sign seen followed by splenomegaly (33.33%), lymphadenopathy (6.25%), icterus (6.25%) and pedal edema (2.08%). In the study by Shah SN et al (2014)¹³, the most common physical finding was pallor (100%) followed by splenomegaly (40%), hepatomegaly (21%) and lymphadenopathy (3%).

Table No 2

| Sr.No | Study | Country | Year | No. of | Age range(yr) | M:F | Commonestcause | Secondmostcommoncause |
|-------|-----------------------------------|---------|------|--------|---------------|--------|-----------------------------|--|
| 1 | TilakVandJainR et al ⁴ | India | 1998 | 77 | 5-70 | 1.14:1 | MegaloblasticAnaemia(68%) | Aplasticanaemia(7.7%) |
| 2 | Khodkeetal ⁵ | India | 2000 | 50 | 3-69 | 1.3:1 | MegaloblasticAnaemia(44%) | Aplastic anaemia (14%) |
| 3 | Khunger J.M. et al ² | India | 2002 | 200 | 5-70 | 1.2:1 | MegaloblasticAnaemia (74%) | Aplastic anaemia (14%) |
| 4 | Jhaetal ⁷ | Nepal | 2008 | 148 | 1-79 | 1.5:1 | HypoplasticAnaemia(29.5%) | Megaloblasticanaemia (23.6%) |
| 5 | GayathriB N et al ⁶ | India | 2011 | 104 | 2-80 | 1.2:1 | MegaloblasticAnaemia (74%) | Aplasticanaemia(18.26%) |
| 6 | Goli N et al ¹⁴ | India | 2016 | 54 | - | - | MegaloblasticAnaemia(54.5%) | Malignant & premalignant conditions(20.5%) |
| 7 | Present study | India | 2014 | 100 | 12-80 | 1.7:1 | MegaloblasticAnaemia(78%) | Aplastic anaemia(12%) |

A total of 100 cases of pancytopenia were studied. Age, presenting complaints, peripheral blood picture, Bone marrow examination and various causes of pancytopenia were studied in all cases. The commonest cause of pancytopenia in various studies throughout the world has been aplastic anemia. This is in sharp contrast with the result of our study where the commonest cause of pancytopenia was found to be megaloblastic anemia. Similar findings were observed in other studies done in India.

Incidence of megaloblastic anemia was 78% in our study. Incidence of 72% was reported by Khunger *JM et al.*; 74% by Gayathri BN et al and 68%, by Tilak *V et al.*^{2,4,6} All the above studies have been done in India, and they stress the importance of megaloblastic anemia being the major cause of pancytopenia. It is a rapidly correctable disorder and should be promptly notified.²

Incidence of aplastic anemia varies from 10% to 52% among pancytopenic patients.⁵ The incidence of hypoplastic anemia in our study was 12%, which correlated with the corresponding figures in studies done by Khodke *K et al.* and Khunger *JM et al.*, Both observed an incidence of 14%.^{2,5} A higher incidence, viz., 29.5%, was reported by Jha *et al.*⁷

All the above studies have been done in India and they stress importance of megaloblastic anemia being major cause of pancytopenia.

CONCLUSION

The commonest cause of pancytopenia in our study and studies done in India is megaloblastic anemia. All these studies seem to reflect the higher prevalence of nutritional anaemia in Indian subjects.

The present study concludes that detailed primary hematological investigation along with bone marrow aspiration in pancytopenic patients helps to determine the cause of pancytopenia, which is important for planning further investigation and management.

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