



## Original Research Article

## Clinico – Haematological study of pancytopenia

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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 ranging from simple drug – induced bone marrow hypoplasia, megaloblastic marrow to fatal bone marrow aplasias and leukemias. The severity of pancytopenia and the underlying pathology determines the management and prognosis. Thus, identification of the correct cause will help in implementing appropriate therapy.

**Objectives:** To study the clinical presentations in pancytopenia due to various causes. To evaluate hematological parameters including bone marrow aspiration and trephine biopsy wherever possible.

**Materials and Methods:** This is a prospective study to evaluate patients with pancytopenia who presented to hematology unit, department of pathology, KIMS, Hubli over a period of two years. Patients on chemotoxic therapy and radiotherapy were excluded from the study.

**Results:** A total of 115 patients were evaluated in this study. Among 115 cases, age of patients ranged from 3 – 80 years with a mean age of 42 years with male predominance. Male to female ratio was 1.5: 1. Most of the patients presented with generalized weakness and fever. Commonest physical finding was pallor followed by splenomegaly and hepatomegaly. Dimorphic anemia was the commonest blood picture. Bone marrow aspiration was conclusive in all cases. Commonest marrow finding was hypercellularity with megaloblastic erythropoiesis.

**Conclusion :** Pancytopenia is not an uncommon hematological problem encountered in clinical practice and should be suspected on clinical grounds when a patient presents with unexplained anemia, prolonged fever and tendency to bleed. Hence, present study concludes the detailed primary hematological investigations along with bone marrow aspiration and bone marrow trephine biopsy in cytopenic patients is helpful for understanding the disease process, to diagnose or to rule out the causes of cytopenia. It is also helpful in planning further investigations and management.

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## 1. Introduction

Cytopenia is a disorder in which of production of one or more blood cell types ceases or is greatly reduced.<sup>1</sup> 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.<sup>2</sup> It is not a disease entity, but a triad of findings that may result from a number of disease processes primarily or secondarily involving the bone marrow. The presenting

symptoms are usually attributable to anemia, leucopenia or thrombocytopenia. The causes of pancytopenia may be due to reduced bone marrow activity, defective or ineffective hemopoiesis and increased destruction of cells by overactive reticuloendothelial system.<sup>3</sup>

Pancytopenia is a striking feature of many serious and life – threatening illnesses ranging from simple drug – induced bone marrow hypoplasia, megaloblastic marrow to fatal bone marrow aplasias to leukemias. The pattern of diseases leading to pancytopenia is expected to vary in different population groups with their difference in age pattern, nutritional status and prevalence of infective

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disorder.<sup>4</sup>

Marrow cellularity and composition in cases of pancytopenia differ in relationship to underlying pathologic conditions. The marrow is generally hypocellular in cases of pancytopenia caused by a primary production defect. Cytopenias resulting from ineffective hematopoiesis, increased peripheral utilization or destruction of cells and bone marrow invasive processes are usually associated with a normocellular or hypercellular marrow.<sup>4</sup>

Therefore bone marrow examination, such as bone marrow aspiration and trephine biopsy, are extremely helpful in the evaluation of pancytopenia.<sup>4</sup> The severity of pancytopenia and the underlying pathology determine the management and prognosis of these patients.<sup>5</sup> In India, the causes of pancytopenia are not well defined.<sup>4</sup> Previous studies done in India, stress the importance of megaloblastic anemia as being the major cause of pancytopenia.<sup>5,6</sup>

So the present has been undertaken to evaluate the various causes of pancytopenia and to correlate the peripheral blood findings with bone marrow aspirate and trephine biopsy wherever possible. Thereby, this data would help in planning the diagnostic and therapeutic approach in patients with pancytopenia.

## 2. Objectives

1. To study the clinical presentation in pancytopenia due to various causes.
2. To evaluate haematological parameters including bone marrow aspiration and trephine biopsy wherever possible in pancytopenia.

## 3. Materials and Methods

This is a prospective study to evaluate patients with pancytopenia who presented to hematology unit, department of pathology, KIMS, Hubli over a period of two years. Case selection was based on clinical features and supported by laboratory evidence. Bone marrow aspiration and bone marrow trephine biopsy wherever possible was subsequently carried out after obtaining written consent from the patient or the guardian. Patients on myelotoxic therapy or radiotherapy were excluded from the study.

## 4. Results

A total of 115 patients were evaluated in this study. Among 115 cases, age of patients ranged from 3 – 80 years with a mean age of 42 years with male predominance. Male to female ratio was 1.5: 1. Most of the patients presented with generalized weakness and fever. Commonest physical finding was pallor followed by splenomegaly and hepatomegaly. Dimorphic anemia was the commonest blood picture. Bone marrow aspiration was conclusive in all cases. Commonest marrow finding was hypercellularity with megaloblastic erythropoiesis. The commonest cause for

pancytopenia was megaloblastic anemia (67.82%) followed by aplastic anemia (12.17%), Subleukemic leukemia (2.6%), myelofibrosis (2.6%), multiple myeloma (1.73%), tuberculosis (0.86%), malaria (1.93%) and adenocarcinoma deposits in the marrow (0.86%).

## 5. Discussion

The age of the patients ranged from 3 years to 80 years with a mean age of 42 years. Cytopenias were observed more in males (61.74%) than females (38.26%) with a M:F ratio of 1.5:1. The age and sex distribution of our study was in comparison with the study done by Khunger et al and Kumar et al that is age range of 3 – 80 years with male predominance.

The most common presenting complaints in our study were generalized weakness (100%) and fever (52.17%). The most common physical finding was pallor (100%) followed by splenomegaly (28.70%) and hepatomegaly (16.52%). The presenting symptoms were usually attributed to anemia, or thrombocytopenia. Leucopenia was an uncommon cause of the initial presentation of the patient, but can become the most serious threat to life during course of the disorder.

The most common presenting symptom of fever with generalized weakness and sign of pallor was in comparison with the study done by Khunger et al and Tilak V et al.

The commonest cause of pancytopenia, reported from various studies throughout the world has been aplastic anemia. The variations in the frequency of various diagnostic entities causing pancytopenia has been attributed to difference in methodology and stringency of diagnostic criteria, geographic area, period of observation, genetic differences and varying exposure to myelotoxic agents.

The most commonest cause for pancytopenia in the present study was megaloblastic erythropoiesis followed by aplastic anemia which was in concordance with the study done by Khunger et al. The incidence of megaloblastic anemia varied from 0.8 to 32.2% of all pancytopenia patients. Our incidence of megaloblastic anemia was 67% as compared to the incidence of 72% as reported by Khunger JM et al and 68% by Tilak V et al. Incidence of aplastic anemia varies from 10 to 52% among pancytopenia patients. Our incidence of hypoplastic anemia was 15%, which correlated with the studies done by Khodke K et al and Khunger J M et al whose incidence for the same was 14%. A higher incidence of 29.5% was reported by Kumar R et al. Most of the aplastic anemia were idiopathic. Hepatitis was noted in one case.

Hypersegmented neutrophils were noted in 51.35% in the present study as compared to 84.9% in Tilak V et al study. Khunger JM et al demonstrated no hypersegmented neutrophils in megaloblastic anemia. Also relative lymphocytosis in aplastic anemia was noted in 52.63% in our study as compared to 50% in Tilak V et al study and Khunger JM et al study. In the present

study of 115 cases, 52 cases had dimorphic anemia, macrocytic anemia was found in 23 cases, normocytic normochromic and normocytic hypochromic anemia and microcytic anemia constituted rest of the cases.

In the present study 2.60% of subleukemic leukemia cases were encountered compared to the study done by Khunger et al who reported 5% of subleukemic leukemia cases. In the present study, 3 cases of AML were reported where as Kumar et al reported 13 cases of AML. In the present study, one case of malaria was reported which correlated with studies done by Khunger et al and Kumar et al. In present study, two cases of multiple myeloma was reported which correlated with studies done by Khunger et al and Khodke et al. In the present study, one case of adenocarcinoma deposits in bone marrow was reported which was not reported in any of the other studies. In the present study, one case of tuberculosis was reported which correlated with study done by Khunger et al.

## 6. Conclusion

Pancytopenia is not an uncommon hematological problem encountered in clinical practice and should be suspected on clinical grounds when a patient presents with unexplained anemia, prolonged fever and tendency to bleed. The physical findings and peripheral blood picture provides valuable information in the workup of cytopenia patients. Bone marrow examination is accurate, reproducible, rapidly available information at an economical cost and with minimal discomfort to the patient.

## 7. Conflicts of Interest

All contributing authors declare no conflicts of interest.

## 8. Source of Funding

None.

## References

1. Firkin F, Chesterman C, Pennington D, Rush B. Pancytopenia. In: De Gruchy's Clinical Hematology in medical practice 5th edn. London: Black well Science; 1989. p. 119–34.
2. Ishtiaq O, Baqai HZ, Anwer F, Husain N. Patterns of pancytopenia patients in a general medical ward and a proposed diagnostic approach. *J Ayub Med Coll Abbottabad*. 2004;16(1):8–13.
3. Guinan EC, Shimamura A, Greer JP, Foerster J, Lukens JN, Rodgers GM, et al. Acquired and inherited aplastic anaemia syndromes. In: 11th Edn. Philadelphia: Lippincott Williams and Wilkins; 2004. p. 1397–419.
4. Kumar R, Kalra SP, Kumar H, Anand AC, Madan M. Pancytopenia - A six year study. *JAPI*. 2001;49:1079–81.
5. Tilak V, Jain R. Pancytopenia - A Clinico - hematological analysis of 77 cases. *Indian J Pathol Microbiol*. 1992;42(4):399–404.
6. Khunger JM, Arculselvi S, Sharma U, Ranga S, Talib VH. Panytopenia - A Clinico haematological study of 200 cases. *Indian J Pathol Microbiol*. 2002;45(3):375–9.

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