

## Original Research Article

# Clinicohematological profile of pancytopenia: a study from a tertiary care hospital

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## ABSTRACT

**Background:** Pancytopenia is common clinical condition which we encounter in our daily clinical practice. Pancytopenia is characterized by decrease in all the three major components of blood like Red Blood Corpuscles, White blood Corpuscle, and platelets. This study was carried out to look for causes of pancytopenia and clinical presentations at tertiary care hospital in north India.

**Methods:** The study was conducted at MLN Medical College, Allahabad in the Department of Medicine between June 2018 to July 2019. Total 125 patients who attended department of medicine were screened for study. After exclusion 94 patients were studied prospectively.

**Results:** Out of 94 patients 59 were males, and 35 females in the study group. Male to female ratio was 1.6:1. Maximum patients were between 20 years to 35 years of age group. Pallor and weakness were most common clinical feature in this study group. Out of various etiological causes vitamin B12 deficiency was the commonest in our study. 48(51%) patients had megaloblastic anemia due to vitamin B12 deficiency. Second most common etiological factor was hypo plastic/aplastic anemia. Other etiological abnormalities were hypersplenism, dengue, malaria, sepsis, myelodysplastic syndrome and multiple myeloma.

**Conclusions:** Bone marrow examinations, aspiration cytology or biopsy are important tool for diagnosis of pancytopenia. Underlying cause and severity of disease determine the outcome of pancytopenia. The present study concluded that most of patients with pancytopenia have treatable cause so early diagnosis will be helpful for management of patients.

**Keywords:** Anemia, Hematological profile, Pancytopenia, Thrombocytopenia

## INTRODUCTION

Pancytopenia is common clinical condition which we encounter in our daily clinical practice. Pancytopenia is not a disease but it is clinical triad; which results from primary or secondary involvement of bone marrow.<sup>1,2</sup> Pancytopenia may be due to simple reversible etiological factors, like drug induced hypoplasia and megaloblastic anemia or due to life threatening illness like bone marrow aplasia or leukemia.<sup>3</sup> Pancytopenia is characterized by decrease in all the three major components of blood like

Red Blood Corpuscles, White blood Corpuscle, and platelets.<sup>4</sup> When hemoglobin is <12.0 gm/dl, total leucocyte count less than  $4 \times 10^9/L$  and platelet count < $100 \times 10^9/L$ .

Anemia may be classified as mild when hemoglobin is between 9-12 gm/dl, moderate 5-9 gm/dl, and severe when hemoglobin is less than 5 gm/dl. Leucopenia is mild when leucocyte is between  $3000-4000/mm^3$ , Moderate when leucocyte count is between  $1000-3000/mm^3$ , Severe when leucocyte is less than  $1000/mm^3$ .

Thrombocytopenia is mild when platelet is between 50,000 to 100,000/mm<sup>3</sup> moderate when between 20,000 to 50,000/mm<sup>3</sup>, severe when less than 20,000/mm<sup>3</sup>.<sup>5</sup>

The Incidence of various causes of pancytopenia varies from different geographical and genetic distribution.<sup>6</sup> Management and prognosis of pancytopenia depends on severity and etiopathogenesis of pancytopenia.<sup>7</sup> Clinical presentation of pancytopenia depends on severity of type of cells deficient. Presentation may be weakness, dyspnea on exertion, pallor, headache, dizziness, increased susceptibility to infection or purpura, melena, hematemesis, epistaxis, gum bleeding are other presentations.<sup>8</sup>

The present study aims to evaluate the cases of pancytopenia by peripheral smear, bone marrow aspiration and/or bone marrow biopsy and to find out the etiology of pancytopenia along with clinical and hematological features.

**METHODS**

The present study, “Clinicohematological Profile of Pancytopenia: A Study from a Tertiary Care Hospital” was carried out in the Department of Medicine, MLN medical college Hospital, Allahabad, during a period of 1-year from June 2018 to July 2019. This was a cross section observational study.

This study was carried out to look for causes of pancytopenia at tertiary care hospital in north India and clinical presentations.

**Inclusion criteria**

- Patient above age of 18 years.
- Patients having pancytopenia in complete blood count.

**Exclusion criteria**

- Patients on radiotherapy and chemotherapy.
- Patients who have already treated with blood and blood products.
- Patients having connective tissue diseases, HIV infection, tuberculosis, sarcoidosis, or chronic alcoholics.

Patient presented to department of medicine above age of 18 years were included in this study. Total 125 patients who attended department of medicine were screened for study. After exclusion 94 patients were studied prospectively. All patients were evaluated carefully with detailed clinical history and proper physical examination, with special emphasis on lymph node, hepatosplenomegaly, sternal tenderness. Blood investigations included complete blood count, General blood picture, serum iron profile, serum folate level, serum vitamin B12 level, renal function test, liver

function test, serology for HIV, HBsAg, HCV, MP antigen, widal test, Chest X ray, USG abdomen, bone marrow examination, ANA, dengue serology, sputum C/S, blood C/S. Informed consent was taken for bone marrow aspiration and biopsy.

**RESULTS**

Total 94 patients who qualified for inclusion criteria were included in this study. Table -1 shows baseline characters of study patients. There were 59 (62.7%) males, and 35 (37.2%) females in the study group. Patient’s age ranges between 18 years to 78 years. Maximum patients were between 20 years to 35years of age group. Mean age of studied population was 31 years. Male to female ratio was 1.6:1.

**Table 1: Baseline clinical characteristics of patients (n= 94).**

Character	Number of patients	
Age range (years)	20-35	36 (38%)
	35-50	22 (23%)
	50-65	21 (22%)
	65-80	15 (15.9%)
Sex	Males	59 (62.7%)
	Females	35 (37.2%)

Table 2 shows the clinical features in pancytopenia patients. Pallor and weakness were most common clinical feature in this study group, which was present in all 94 (100%) patients presenting with pancytopenia. Second most presenting symptom was easy fatigability, which was present in 87 (92.5%) patients. Fever was presenting feature in 29 (30.8%) patients. Splenomegaly was present in 25 (26.5%) patients. Hepatomegaly was present in 16(17.02%) patients.

**Table 2: Clinical features in study patients.**

Clinical features	Number of patients(n=94)
Pallor	94 (100%)
Weakness	94 (100%)
Easy fatigability	87 (92.5%)
Fever	29 (30.8%)
Splenomegaly	25 (26.5%)
Hepatomegaly	16 (17.2%)

The Hemoglobin level in our study ranges from 3.2 gm/dl to 11.9 gm/dl. Table 3 shows severity of anemia in study group. In this study 42(44.68%) patients were mild anemic, 38(40.42%) patients were moderate anemic and14 (14.89%) patients were severely anemic. The leucocyte count in our study ranges from 610/ cmm to 3800/cmm. Out of them 52(55.31%) patients had leucocyte counts between >3000 to <4000/cmm and 35(37.23%) patients had leucocyte counts between <1000 to <3000/cmm, and 7(7.44%) patients had leucocyte counts below 1000/cmm. In this study, the platelet count

ranges from 10,000/cmm to 98,000/cmm. Maximum number of patients had platelet count range between 50,000/cmm to 100,000/cmm. 49(52.1%) patients had platelet count range between 50,000/cmm to 100,000/cmm. 40(42.55%) patients had moderate thrombocytopenia and their platelet count were between >20,000/cmm to <50,000/cmm. Only 5 (5.3%) patients in our study were severely thrombocytopenic and had platelet count were less than 20,000/ cmm.

**Table 3: Severity of anemia in study patients.**

	Number of patients (n=94)
Mild anemia	42 (44.6%)
Moderate anemia	38 (40.4%)
Severe anemia	14 (14.8%)

Table 4 shows different etiology of pancytopenia in the study population. Out of various etiological causes vitamin B12 deficiency was the commonest in our study. 48(51%) patients had megaloblastic anemia due to vitamin B12 deficiency. Second most common etiological factor was hypo plastic/aplastic anemia, which was present in 13(13.82%) patients. Other etiological abnormalities were hypersplenism, dengue, malaria, sepsis, myelodysplastic syndrome and multiple myeloma.

**Table 4: Etiology of pancytopenia in study patients.**

Etiology	Number of patients (n=94)
Vitamin B12 deficiency	48 (51.0%)
Hypoplastic/Aplastic marrow	13 (13.8%)
Hypersplenism	11 (11.7%)
Dengue	8 (8.5%)
Malaria	7 (7.4%)
Sepsis	3 (3.1%)
Myelodysplastic syndrome	2 (2.1%)
Multiple myeloma	2 (2.1%)

**DISCUSSION**

Pancytopenia is common clinical condition which we encounter daily, is caused by various etiological factors. It may be due to decreased bone marrow function or may be due to increased destruction of blood cells. Etiology of pancytopenia differ in different geographical area, depending on prevalence of infectious diseases, nutritional status genetic and environmental condition. In this study the commonest cause of pancytopenia was megaloblastic anemia due to vitamin B12 deficiency, which was present as causative factor in 48 (51%) cases, second commonest cause was aplastic anemia; which was present in 13.8% cases, hypersplenism was present in 11.7% cases, dengue in 8.5%, malaria in 7.4 % cases, sepsis in 3.1%, myelodysplastic syndrome in 2.1% cases and multiple myeloma in 2.1% cases of pancytopenia. Gayatri and Rao conducted a study of 104 patients in south India found megaloblastosis (74%) was commonest

cause of pancytopenia and aplastic anemia (18%) was second most common.<sup>1</sup> Khunger et al, studied 200 cases in general hospital, in North India.<sup>4</sup> In their study commonest cause of pancytopenia was megaloblastic anemia (72%), second common cause was aplastic anemia (14%), followed by subleukemic leukemia(5%), myelodysplastic syndrome (2%), hypersplenism due to kalazar (2%) and due to malaria (1%), nonhodgkins lymphoma, multiple myeloma and myelofibrosis (1%) each. Disseminated tuberculosis, and waldenstorm macroglobulinemia (0.5%) each. Kumar et al, studied 166 cases of pancytopenia, pancytopenia.<sup>5</sup> Aplastic anemia was causative factor in 49 patients, megaloblastic anemia in 37 patients, aleukemic leukemia in 30 patients and hypersplenism in 19 cases. Aziz T, also found that megaloblastic anemia is a common cause of pancytopenia.<sup>9</sup> Imbert et al, studied 213 pancytopenic patients in France, found malignant myeloid disorder in (42%) lymphoid malignant disorder in (18%), aplastic anemia in (10%).<sup>10</sup>

In study population, slight male predominance was seen. Ratio of male to female was 1.6:1.0 and commonest age group was 20 to 35 years age. In prospective study done by Jain and Nari wadekar at tertiary care hospital in Maharashtra; male predominance was observed and male: female ratio was 2.6:1.0 and commonest age group was 3rd and 4th decade of life.<sup>2</sup> In the study by khodke et al, (50 cases); male female ratio was 1.3:1.0 and maximum number of cases were between 12 to 30 years of age group (44.0%).<sup>3</sup> In the study by Tilak et al, which included 77 cases of pancytopenia, male to female ratio was 1.13: 1.00, and maximum number of cases were <20 years (32.4%).<sup>7</sup>

Pallor and weakness were most common clinical feature in this study group, which was present in all the patients (100%) presenting with pancytopenia. Second most presenting symptom was easy fatigability, which was present in (92.5%) patients. Fever was presenting feature in (30.8%) patients. Splenomegaly was present in (26.5%) patients and hepatomegaly was present in 16(17.02%) patients. In a study done by Khodake et al, fever (40%), was most common presenting symptom followed by weakness (30%), and bleeding manifestation in 20% cases studied.<sup>3</sup> Yadav et al, found in their study generalized weakness and easy fatigability as most common presenting complains.<sup>11</sup> In a study by Santra G, Das BK most common presenting complaints was weakness (68.2%), followed by fever in 47.7% of cases and bleeding manifestation was presenting complaints in 33.7% of cases.<sup>12</sup>

In this study 2 cases of multiple myeloma were diagnosed, the age was 52 years and 68 years. Patients presented with backache dyspnoea on exertion and easy fatigability. One patient presented with chest pain also. Peripheral blood smear showed pancytopenia and serum electrophoresis show M band, diagnosis was confirmed by bone marrow biopsy.

There were few limitations of the study, first, we included a population admitted to a single center. Second, the study population was possibly underpowered to detect a significant difference in in-hospital mortality. Third, our data are only hypothesis generating, because they do not provide evidence to support a causal relationship, and they require confirmation in suitably designed clinical trials.

## CONCLUSION

Pancytopenia is common hematological condition which clinicians face daily in their day to day clinical practice; both in and outpatients department. Pancytopenia should be suspected in patients presenting with generalized weakness, easy fatigability, pallor, and with bleeding manifestations or pyrexia. Bone marrow examinations, aspiration cytology or biopsy are important tool for diagnosis of pancytopenia. Underlying cause and severity of disease determine the outcome of pancytopenia. The present study concluded that most of patients with pancytopenia have treatable cause so early diagnosis will be helpful for management of patients.

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