

COMMON CAUSES OF PANCYTOPENIA IN PATIENTS ADMITTED IN MEDICAL WARD

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Abstract

Objective: To assess common causes of pancytopenia in patients admitted in medical ward in tertiary care hospital.**Study Design:** Cross-sectional study**Place & Duration of Study:** Department of General Medicinal, Liaquat University of Medical and Health Sciences, Jamshoro from December 2024 to May 2025.**Methodology:** A total of 115 patients with pancytopenia had age between 18-75 years, both female and male patients presented in the department of general medicine ward were enrolled. After taking all the aseptic measures and with standard technique the diagnostic bone marrow aspiration was performed under adequate local anesthesia by using Salah and Jamshidi needles, respectively and bone marrow sample was sent to laboratory for biopsy. Biopsy report confirmed causes of pancytopenia. Collected data was analyzed using SPSS version 27. Quantitative outcome variables were reported in terms of mean and standard deviation after the confirmation of the normality of the data. Qualitative data were reported as frequency and percentage.**Results:** The mean age of the patients was 39.5 ± 2.61 years, mean body mass index (BMI) was 24.4 ± 3.1 kg/m² and mean duration of symptoms prior to presentation was 7.2 ± 3.8 weeks. 68 (59%) were female patients and 47 (41%) were male. Pallor was the most common clinical feature, observed in 107 patients (93%). Aplastic anemia was the most common cause of pancytopenia, identified in 43 patients (37.3%), making it the leading etiological factor in this cohort. Acute leukemia was the second most frequent cause, seen in 16 patients (13.9%), megaloblastic anemia accounted for 14 cases (12.17%), erythroid hyperplasia was observed in 13 patients (11.3%), Myelodysplastic syndromes (MDS) and rheumatoid arthritis each contributed to 6% of cases (7 patients each).**Conclusion:** Pancytopenia is a common hematological problem and should be suspected in patient presenting with unexplained anemia, weakness, fever or bleeding manifestation.

INTRODUCTION

Pancytopenia is an important hematologic problem encountered frequently in clinical practice characterized by a reduction in all three

peripheral blood cell lineages, i.e., anemia, leucopenia, and thrombocytopenia, caused by myriad disease processes.^{1,2} It's not a disease entity

itself but a presentation caused by diverse disease processes affecting bone marrow and/or peripheral cell lines.^{3,4} Clinical presentation is related to the severity of cytopenias, leading to common presenting symptoms, including generalized weakness, shortness of breath, fever, weight loss, bleeding. The management and prognosis of pancytopenia depend upon its severity and underlying etiology.⁵

Its causes might include benign disorders like such as nutritional deficiencies, infection, and drug effects, to malignant diseases such as lymphomas and leukemias.⁶ When creating treatment regimens, choosing the appropriate etiology is essential.⁷ Geographical factors, socioeconomic factors, and endemic diseases all have an impact on its genesis.⁸ One of the most common causes of pancytopenia in developing nations is nutritional megaloblastic anemia, which is brought on by a lack of folate or vitamin B12. Because it can be easily treated, patients who exhibit unexplained pancytopenia, macrocytosis, hypersegmented neutrophils, and neurological symptoms should be checked for this condition.^{9,10}

The majority of the cases of pancytopenia are cured with the specific treatment guided by the cause as well as the extent of severity of the disease or, at times, the cases would require the timely initiation of supportive treatment to reduce morbidity and mortality. Hence, this study was conducted to assess common causes of pancytopenia in patients admitted in medical ward in tertiary care hospital.

Methodology:

This study was carried out over a period of six months from December 2024 to May 2025 in the Department of General Medicinal, Liaquat University of Medical and Health Sciences, Jamshoro. Patients with pancytopenia had age between 18-75 years, both female and male patients presented in the department of general medicine ward were enrolled using non-probability sampling technique, after taking written informed consent. Patients already diagnosed as having HIV or AIDS, patients already diagnosed with any malignancy and taking immunosuppressive drugs, patient with mono and

bicytopenia and pregnant women were excluded. Patients was considered positive for Pancytopenia if he/she exhibited at least one of the following clinical sign & Symptoms like fatigue, low grade fever, pallor, abdominal pain and bone pain along with the presence of all of the following Hemoglobin (<13 g/dl in males or hematocrit (Hct) less than 41% and < 12 g/dl in females or Hct less than 36%), TLC (< 4 x 10⁹/L in both males and females) and Platelet cutoff (< 150 x 10⁹/L in both males and females) on CBC and was also confirmed by blood-forming stem cells in the bone marrow biopsy report. Sample size calculation was based on previous study and by using WHO calculator. Hossain MZ et al reported that erythroid hyperplasia was 13.88%. So, 115 cases of pancytopenia were recruited to estimate least proportion within 4% margin of error and 95% confidence interval. Physical examination like complete blood count with peripheral film, erythrocyte sedimentation rate (ESR), malarial parasites (MP), liver function test, renal function tests, PT and viral profile (HBsAg, Anti-HCV), ultrasonography of abdomen was taken. After taking all the aseptic measures and with standard technique the diagnostic bone marrow aspiration was performed under adequate local anesthesia by using Salah and Jamshidi needles, respectively and bone marrow sample was sent to laboratory for biopsy. Biopsy report confirmed causes of pancytopenia.

Collected data was analyzed using SPSS version 27. Quantitative outcome variables were reported in terms of mean and standard deviation after the confirmation of the normality of the data. Qualitative data were reported as frequency and percentage.

Results:

A total of 115 patients with pancytopenia were included in the study. The mean age of the patients was 39.5±2.61 years, indicating that pancytopenia was predominantly observed in middle-aged adults in this cohort. The mean body mass index (BMI) was 24.4±3.1 kg/m². The mean duration of symptoms prior to presentation was 7.2±3.8 weeks, reflecting a subacute pattern of

illness in the majority of cases. 68 (59%) were female patients and 47 (41%) were male. Regarding comorbidities, 42 (36.5%) of patients were hypertensive and 30 (26%) were diabetic. This indicates a substantial burden of chronic

non-communicable diseases in the study population, which may influence disease severity, diagnostic considerations, and overall prognosis (Table 1).

Table 1: Baseline Data of the patients (n=115)

Demographic Data	(mean $\pm$ sd)/n(%)
Age (Years)	39.5 $\pm$ 2.61
BMI (kg/m ²)	24.4 $\pm$ 3.1
Duration of symptoms (weeks)	7.2 $\pm$ 3.8
Gender - Male - Female	47 (41%) 68 (59%)
Hypertension	42 (36.5%)
Diabetes	30 (26%)

Pallor was the most common clinical feature, observed in 107 patients (93%), reflecting the high prevalence of anemia in this cohort. Generalized weakness was reported in 86 patients (74.7%), while fever was present in 61 patients (53%), indicating systemic involvement in a substantial number of cases. Bleeding manifestations were noted in 40 patients (35%), and gastrointestinal symptoms were reported in 36 patients (31.3%),

suggesting the involvement of mucosal or systemic processes. Splenomegaly was present in 23 patients (20%), and generalized body aches were reported in 22 patients (19%). Respiratory symptoms occurred in 16 patients (13.9%), whereas lymphadenopathy and jaundice were less frequent, observed in 7 (6%) and 4 (3.4%) patients, respectively (Table 2).

Table 2: Presenting Complaints and Physical Finding in Pancytopenia Patients

Presenting complaints and physical finding	(mean $\pm$ sd)/n(%)
Pallor	107 (93%)
Generalized weakness	86 (74.7%)
Fever	61 (53%)
Bleeding manifestation	40 (35%)
GIT Symptoms	36 (31.3%)
Splenomegaly	23 (20%)
Generalized body aches	22 (19%)
Respiratory symptoms	16 (13.9%)
Lymphadenopathy	7 (6%)
Jaundice	4 (3.4%)

Aplastic anemia was the most common cause of pancytopenia, identified in 43 patients (37.3%), making it the leading etiological factor in this

cohort. Acute leukemia was the second most frequent cause, seen in 16 patients (13.9%), megaloblastic anemia accounted for 14 cases

(12.17%), erythroid hyperplasia was observed in 13 patients (11.3%). Myelodysplastic syndromes

(MDS) and rheumatoid arthritis each contributed to 6% of cases (7 patients each) (Table 3).

Table 3: Causes of Pancytopenia

Causes of Pancytopenia	(mean $\pm$ sd)/n(%)
Megaloblastic anemia	14 (12.17%)
Myelodysplastic syndromes (MDS)	7 (6%)
Acute Leukemia	16 (13.9%)
Aplastic anemia	43 (37.3%)
Erythroid Hyperplasia	13 (11.3%)
Rheumatoid Arthritis	7 (6%)

Discussion:

Pancytopenia is a common and serious clinical and hematological problem. Pancytopenia is a common finding in clinical practice. It is not a disease in itself but there are various causes of this clinical trial of Anemia, neutropenia and thrombocytopenia. The early diagnosis of the causation of Pancytopenia is important because most of these causes are treatable.

A total of 115 cases of pancytopenia were studied. Age gender wise distribution, clinical features, and various causes of pancytopenia were evaluated and observations compared to those in studies published in the literature.

We found an equal proportion of pancytopenia between both genders, that is, comparable to Osama et al,¹¹ whereas the Yaseen et al. study¹² showed that females constituted 59% of the pancytopenic patients while most other studies showed a male preponderance. Samreen et¹³ observed a male-to-female ratio of 1.8:1 while Umbreen et al.¹⁴ and Ikram et al¹⁵ reported this to be 2.5:1 and 2:1, respectively.

Furthermore, we observed that pancytopenic patients were younger, with a mean age of 39.5 years, which is consistent with Samreen et al,¹³ Tariq et al,¹⁶ and Hayat et al.¹⁷

Pallor was the most common clinical feature, observed in 107 patients (93%), reflecting the high prevalence of anemia in this cohort. Generalized weakness was reported in 86 patients (74.7%), while fever was present in 61 patients (53%), indicating systemic involvement in a substantial

number of cases. Bleeding manifestations were noted in 40 patients (35%), and gastrointestinal symptoms were reported in 36 patients (31.3%), suggesting the involvement of mucosal or systemic processes. Splenomegaly was present in 23 patients (20%), and generalized body aches were reported in 22 patients (19%). Respiratory symptoms occurred in 16 patients (13.9%), whereas lymphadenopathy and jaundice were less frequent, observed in 7 (6%) and 4 (3.4%) patients, respectively. Similarly, in a study by Khan TA and colleagues, common clinical presentations were pallor (95%, n=150), followed by generalized weakness (75%, n=120), fever (52%, n=83), bleeding manifestation (37.5%, n=60), gastrointestinal symptoms (32.5%, n=52) and splenomegaly (23.5%, n=38).¹⁸ Niazi M et al, reported in its study that generalized weakness (68.2%) was the commonest symptoms followed by fever (47.7%) and bleeding manifestation (33.33%).¹⁹

Aplastic anemia was the most common cause of pancytopenia, identified in 43 patients (37.3%), making it the leading etiological factor in this cohort. Acute leukemia was the second most frequent cause, seen in 16 patients (13.9%), megaloblastic anemia accounted for 14 cases (12.17%), reflecting a significant proportion of potentially reversible causes of pancytopenia, particularly in populations where nutritional deficiencies are prevalent, erythroid hyperplasia was observed in 13 patients (11.3%), indicating compensatory marrow response in a subset of

cases. Myelodysplastic syndromes (MDS) and rheumatoid arthritis each contributed to 6% of cases (7 patients each), demonstrating that both clonal hematological disorders and autoimmune conditions play a smaller but clinically relevant role in the etiology of pancytopenia.

Hossain MZ et al; reported that Aplastic anemia was the commonest cause that was observed in 27.78% cases followed by Megaloblastic anemia 16.67% and erythroid hyperplasia 13.88%, Myelodysplastic disorder 11.1%, Acute Myeloid Leukemia 8.3%, Acute Lymphoblastic Leukemia 8.3%, systemic Lupus Erythematosus 8.3%, Rheumatoid Arthritis 5.6%.²⁰

The incidence of megaloblastic anemia has been reported from 10 % to 74 % in different studies conducted in the subcontinent. This wide variation in the incidence of megaloblastic anemia is probably due to variation in the nutritional status of that particular region where the study is done.

Conclusion:

Pancytopenia is a common hematological problem and should be suspected in patient presenting with unexplained anemia, weakness, fever or bleeding manifestation. Bone Marrow aspiration and Trepine biopsy are useful in diagnosis of the cause of pancytopenia. A larger proportion had a treatable cause, thus carrying a favorable prognosis. It also emphasizes the need for an accurate diagnosis that can facilitate timely treatment and impact morbidity and mortality.

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