

# STUDY OF PANCYTOPENIA IN BALOCHISTAN, PAKISTAN

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## ABSTRACT

**Background:** Pancytopenia refers to a disorder in which all the three formed elements of blood are decreased. This study was aimed to identify the causes and clinical presentation of pancytopenia in subjects living in Balochistan province.

**Material & Methods:** It was a descriptive study carried out for two years from July 2009 to June 2011 in patients admitted to Sandman Provincial Hospital, Bolan Medical College Complex Hospital, Combined Military Hospital and Private Clinics in Quetta with the diagnosis of pancytopenia. Data was collected from hospital admissions for the diseases which may cause pancytopenia by using hematological test reports and other information. One hundred and eighty consecutive patients with pancytopenia were included from both sex and all age (divided in to age groups <20, 21-40 and >41 years).

**Results:** The main causes of pancytopenia were Malaria in 53(29.44%), tuberculosis in 31(17.22%), leukemia in 30(16.67%), aplastic anemia in 24(13.33%), hepatitis in 22(12.22%) and other diseases in 20(11.11%). Overall, 63.89% male subjects were observed in pancytopenia as compared to 36.11% females, further it was noted that malaria was the most common problem in 18.89% male and 10.56% female patients. Leukemia was the 2<sup>nd</sup> problem in males while 3<sup>rd</sup> in females. The results of different age groups showed that patients with age >40 years were mostly 90(50%) affected by pancytopenia, followed by 21-40 years 55(30.66%) and <20 years 35(19.44%). The most common presentation in these patients was fever (71.11%), followed by pallor (42.22%), fatigue (38.33%), weight loss (26.11%) and dizziness (25.56%).

**Conclusions:** Malaria, tuberculosis, aplastic anemia, and leukemia are the leading causes of pancytopenia and the most frequent presentation is fever followed by pallor and fatigue and the most commonly affected age group is more than 40 years in our set up.

**Key Words:** Pancytopenia, Malaria, Tuberculosis, Leukemia, Aplastic anemia.

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## INTRODUCTION

Pancytopenia refers to a disorder in which all three elements of the blood (Erythrocytes, Leukocytes and Platelets) are decrease in counts than normal. Pancytopenia can be due to reduction in hematopoietic cell production in the bone marrow by means of infections, toxins, over use of drugs or idiosyncratic response, malignant cells infiltration or suppression<sup>1</sup>, congenital and autosomal, medication/chemotherapy/alcohol/ radiotherapy and

parasitic infestation.<sup>2-3</sup> The most common cause of pancytopenia is reported to be megaloblastic anemia, followed by aplastic anemia, acute leukemia, and acquired immunodeficiency syndrome (AIDS), hypersplenism, tuberculosis and hepatitis. Aplasia is also the most frequent cause of severe pancytopenia<sup>3</sup>. Patients with aplastic anemia and acute leukemia were usually children, whereas those with megaloblastic anemia were adults. Aplasia is the most frequent cause of severe pancytopenia. Anisocytosis, poikilocytosis, macroovalocytosis, microcytosis, fragmentation, and teardrop erythrocytes were more prominent on the blood films of patients with megaloblastic anemia.<sup>4</sup>

Similarly, in pancytopenia there could be normal cellular or even hypercellular bone marrow, without any abnormal cells, like ineffective hematopoie-

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sis and dysplasia, maturation arrest of all cell lines and peripheral sequestration of blood cells.<sup>5</sup> Pancytopenia is a clinico-hematological problem with widespread discriminated diagnosis but best possible diagnostic approach is still to be defined.

This study was aimed to identify the causes and clinical presentation of pancytopenia in subjects living in Balochistan province.

## MATERIAL AND METHODS

This was a descriptive cross-sectional study carried out for two years from July 2009 to June 2011 on pancytopenia patients. All the cases admitted (n=180) in the hospitals (Sandman Provincial Hospital, Bolan Medical College Complex Hospital, Combined Military Hospital and Private Clinics in Quetta) with the diagnosis of pancytopenia were enrolled in the study.

**Table 1: Causes of pancytopenia in relation to gender.**

Causes	Total		Number
	Percent-age	Percent-age	
Malaria	34 (18.89)	19 (10.56)	53
Leukemia	19 (10.56)	12 (6.67)	31
Tuberculosis	21 (11.67)	9 (5.00)	30
Aplastic anemia	16 (8.89)	8 (4.44)	24
Hepatitis	13 (7.22)	9 (5.00)	22
Other diseases	12 (6.66)	8 (4.44)	20
Total	115 (63.89)	65 (36.11)	180

Pancytopenia was diagnosed as the presence of anemia (hemoglobin <11g/dl), leucopenia (total leukocyte count (TLC) <4000/mm<sup>3</sup>), and thrombocytopenia (platelet count <150,000/mm<sup>3</sup>).<sup>1</sup> Patients were included from both sex and all age groups (divided in age groups <20, 21-40 and >41 years). Patients with cancer chemotherapy were excluded. A questionnaire including relevant history and physical examination was applied in all the patients. The following primary investigations for the pancytopenia were carried out, whenever possible: hemoglobin percentage, TLC, differential leukocyte count (DLC), platelets count, red cell morphology, erythrocyte sedimentation rate (ESR), reticulocyte count, and malaria parasites, urine c/s, sputum c/s, chest x-ray, urinalysis and stool routine examination. The stool occult blood, ultrasound of abdomen, bone marrow aspiration or biopsy were undertaken when required. Furthermore investigations such as HBsAg, Anti-HCV, Anit-HIV, random blood sugar, serum electrolytes, urea, and creatinine were done on the decision of the attending physician.

Complete blood count and bone marrow aspiration were performed in all patients using standard methods. Bone marrow trephine biopsy was done in 25 patients for evaluation of bone marrow in insufficient cells, dry tap or hypoplastic bone marrow. A complete blood count obtained from venous blood was estimated by an automated blood counter (PCE-170N). MS Excel spreadsheet was used for entering and editing the data. *Chi-square test* was used for the analysis of data.

## RESULTS

In the present study 180 patients with pancytopenia were included. Among these 115 (63.89%) were males and 65 (36.11%) females with a male to female ratio of 1.8:1. The causes of pancytopenia in these patients were; Malaria in 53 (29.44%), tuberculosis 31 (17.22%), leukemia 30 (16.67%), aplastic anemia 24 (13.33%), hepatitis 22 (12.22%)

**Table 2: Causes of pancytopenia in relation to age groups.**

Age group (years)	<20	21-40	>40	Total
Causes	n (%)	n (%)	n (%)	n (%)
Malaria	9 (25.71)	18 (32.73)	26 (28.89)	53 (29.44)
Leukemia	5 (14.29)	10 (18.18)	16 (17.77)	31 (17.78)
Tuberculosis	6 (17.14)	10 (18.18)	14 (15.55)	30 (16.11)
Aplastic anemia	4 (11.43)	9 (16.36)	11 (12.22)	24 (13.33)
Hepatitis	3 (8.57)	3 (5.45)	16 (17.78)	22 (12.22)
Other diseases	8 (22.86)	5 (9.09)	7 (7.78)	20 (11.11)
Total	35 (19.44)	55 (30.56)	90 (50)	180 (100)

Table 3: Clinical manifestations according to the causes of pancytopenia.

Clinical manifestation	Malaria	Aplastic anemia	Tuber-closis	Leuke-mia	Hepa-titis	Iron de-ficiency	Other di-seases	Total	Percent-age
No. of patient	53	24	40	21	22	7	13	180	
Fever	52	16	21	15	17	2	5	128	71.11
Fatigue	23	8	10	10	7	5	6	69	38.33
Dizziness	12	7	9		9	4	5	46	25.56
Weight loss	6	5	7	13	12	3	1	47	26.11
Anorexia	6	4	7	5	5	2	3	32	17.78
Night sweat	25	1	7		3	1	2	39	21.67
Pallor	21	10	13	11	10	4	7	76	42.22
Dyspnea	20	4	16	0	0	3	2	36	20.00
Pleurisy	6	0	15	5	6	1	5	38	21.11
Splenomegaly	5	12	3	3	4	0	5	32	17.78
Bleeding	4	6	4	3	6	1	5	29	16.11
Hepatomegaly	4	6	1	1	0	2	2	16	8.89
Lymphadeno-pathy	7	3	1	4	2	4	1	22	12.22

and other diseases 20 (11.11%). Other diseases included (Enteric fever 4, hypersplenism 3, Hodgkin's and Non-Hodgkin's lymphoma 2, visceral leishmaniasis 2, sepsis 1, Congo hemorrhagic fever 1. In 7 patients the cause could not be determined).

The malaria, leukemia, and tuberculosis as a cause of pancytopenia were more prevalent in male patients, however this difference was statistically non-significant ( $p = 0.98$ ). (Table-1)

The results showed that the most commonly affected age group of patients was >41 years (50%) followed by 21-40 years (30.66%) and <20 years (19.44%). However this difference was statistically non-significant ( $p=0.31$ ). (Table 2)

The results revealed that the most common cause of pancytopenia in all age groups was malaria (29.44%) followed by leukemia (17.78%), tuberculosis (16.11%), aplastic anemia (13.33%) and hepatitis (12.22%). The most commonly affected age group of patients was >40 years (50%) followed by 21-40 years (30.66%) and <20 years (19.44%).

The clinical manifestations observed in these patients were fever in 128 (71.11%), followed by pallor (42.22%), fatigue (38.33%), weight loss (26.11%) and dizziness (25.56%). (Table-3)

The results of clinical manifestations according to causes of pancytopenia in all the patients reflected major complaint for fever (71.11%) followed by Pallor (42.22%), fatigue (38.33%), weight loss (26.11%) and dizziness (25.56%). (Table-5)

## DISCUSSION

Pancytopenia has several causes. The frequency of these causes has been reported in a limited number of studies.<sup>6-8</sup> Malaria was considered the most common cause of pancytopenia in this study. Malaria corresponded to the fourth and second most frequent cause in pancytopenic patients respectively.<sup>6-8</sup> Malaria due to *Plasmodium falciparum* has been implicated as a cause of pancytopenia. The high incidence of malaria is observed in low income group with poor sanitation facilities. Eliminate places around home where mosquitoes breed and hide, spraying insecticides on home's premises to kill adult mosquitoes those come inside are critical. Taking anti-malaria medications for malaria prophylaxis is good strategy to prevent malaria.<sup>9,10</sup>

The second common cause of pancytopenia observed in the present study was leukemia (17.22%). Similar findings were observed by several researchers.<sup>2,4,11,12</sup> There are also noticeable evidences that due to radiation after a few months of nuclear explosions on Hiroshima and Nagasaki, Japan, leukemia began to appear among the survivors at a higher rate. Some leukemia victims were fetuses in wombs when exposed to radiation,<sup>3</sup> similar problem was observed after Chernobyl explosions, French nuclear tests in Algeria<sup>13</sup> and USA military activities in Iraq (1991).<sup>14</sup> As a result the people, animals, and environment in these areas have been and will continue to be irradiated by ioniz-

ing radiation for long periods of time.<sup>5,15</sup> These all incidences make strong argument that higher cases of leukemia in patients living Balochistan belong to Afghanistan area (Afghan refugees) are also sufferers of war since long time and due to bombardment, use of chemical and toxic material the water and soil is contaminated that may lead to leukemia. In contrast to the findings of the present study, there are no reports of acute leukemia detected by Kumar et al.<sup>16</sup>

The fourth common cause of pancytopenia in our study was aplastic anemia (13.33%). Similar findings are reported by Kishor et al<sup>17</sup> and Gamal & Safa.<sup>3</sup> In contrast a higher incidence of aplastic anemia (54%) was reported in the Philippines<sup>18</sup> and in Nepal (29.5%).<sup>19</sup> In the present study, males were affected with aplastic anemia much more frequently than females, which might be a result of a higher incidence of occupational exposure to chemicals and pesticides as a common etiological agent for aplastic anemia. Similar results have been obtained by Kumar et al.<sup>16</sup> and Gamal & Safa.<sup>3</sup>

The most common clinical manifestation was fever (71.11%) which was universal in all patients, followed by progressive pallor (42.22%), which is more often observed in malaria and aplastic anemia. Other non-specific features were also observed, such as easy fatigability (38.33%), dizziness (25.56%), and weight loss (26.11%), in patients. These symptoms were observed more in, malaria, aplastic anemia, and leukemia patients. Correlation between pancytopenia and fever, pallor and easy fatigability was noticed; this is in accordance with other studies.<sup>3,6,7,20,21</sup>

## CONCLUSIONS

Malaria, tuberculosis, aplastic anemia, and leukemia are the leading causes of pancytopenia. The most frequent presentation is fever followed by pallor and fatigue and the most commonly affected age group is more than 40 years in our set up.

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### CONFLICT OF INTEREST

Authors declare no conflict of interest.  
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