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Original Research Article

Clinical profile and etiological causes of pancytopenia: a study in a tertiary care hospital

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ABSTRACT

Background: Pancytopenia is a condition which involves the presence of anemia, leucopenia and thrombocytopenia. Symptoms of pancytopenia include fatigue, bleeding, dyspnea, and increased tendency to infections. The evaluation of pancytopenia is by complete blood picture and peripheral blood smear including that of reticulocytes. Bone marrow examination is extremely helpful.
Methods: Demographic details were collected from all the patients and physical examination was done. The patients were asked to undergo biochemical investigations, chest X rays and USG of abdomen. Smears were taken from peripheral blood as well as bone marrow biopsy and stained. Invasive procedure such as bone marrow biopsy is done if needed.
Results: A predominance of males was seen over females and 11-30 years age group was the most affected. The most common cause was megaloblastic anemia followed by aplastic anemia and tuberculosis. The most common symptom were fatigue, dyspnea, fever and bleeding.
Conclusion: Early identification of this disease would help in early planning for management thereby improving the survival rates.

Keywords: Aplastic anemia, Bone marrow biopsy, Megaloblastic anemia, Pancytopenia, Weakness

INTRODUCTION

Pancytopenia is a condition which involves the presence of anemia, leucopenia and thrombocytopenia. That is, there is a presence of low haemoglobin levels, less than 13.5 g/dl in males and less than 11.5 g/dl in females, less than 4 x 103/l leucocyte count and less than 150 x 103/l platelet count.[1] In the initial stages, pancytopenia may go undetected as it involves only a mild marrow function impairment, but during stress or increased demand it becomes more apparent. Pancytopenia usually results from decreased hematopoetic cell production, suppression of marrow growth or replacement of marrow by abnormal cells, suppression of marrow differentiation, defective cell formation, trapping of cells in a hypertrophied and overactive reticuloendothelial system, antibody mediated sequestration and destruction of cells.[2,3]

Symptoms of pancytopenia include fatigue, bleeding, dyspnea, and increased tendency to infections. Fatigue and fever are usually the chief complaints. The incidence of pancytopenia among the population varies with the geographical distribution as well as their genetic condition and mutations.[4]

The cause of pancytopenia is determined by detailed primary haematological investigations along with bone

marrow aspiration and biopsy.[5] Bonemarrow examination allows complete assessment of marrow architecture and detection of focal Bonemarrow lesions Apart from bone marrow failure syndromes and malignancies certain nonmalignant conditions such as infection and nutritional anemia are equally important causes.[6,7]

METHODS

This prospective study was done on 86 patients, of all ages, who had come to the Department of Medicine of Nizams institute of medical sciences and were diagnosed with pancytopenia. This study was done between Feb 2018 and July 2018 for a period of six months. After clearing with the Ethical committee, all the patients were explained the nature of the study and informed consent was taken from all of them. Patients on or those who had recently received chemotherapy or radiotherapy were excluded from the study. Patients who had received platelet transfusions were also excluded from the study.

Demographic details were collected from all the patients, including, age, height and weight. After thorough history taking and medical examination, all the patients were asked to undergo haematological, biochemical investigations, chest X rays and USG of abdomen.

Peripheral blood smear was collected by pin prick method directly onto the slide or a drop of an EDTA blood sample was taken on the slide and a thin and thick smear was done. This EDTA sample was also used for complete blood picture including the hemoglobin estimation and platelet count. The smear was subjected to Leishmann staining and evaluated microscopically.

Bone marrow collected was also subjected to Leishmann stain. In the case of trephine biopsy material, paraffin wax blocks were made and the thin sections were stained with hematoxylin and eosin stain.

Urine and stool samples were analyzed for occult blood. Other investigations such as serological and viral study, RBS, malarial estimation were carried out.

Statistical analysis was done with bar graphs, pie graphs and tables using Microsoft excel.

RESULTS

Out of the 86 patients, males were slightly more affected (61.6%) than females (38.4%) with pancytopenia. Most of them belonged to the 11-20 years age group (39.5%), followed by 21 - 30 years age group (33.7%). Among the males, 37.7% in the 11-20 year age group and 42.4% of the women suffered from pancytopenia. Among the 21-30 years age group, 34% of the men and 33.3% of the women, were affected. None of the females who came to our OPD between the 0-10 years age group had pancytopenia, while 1 males was affected (Table 1).

Table 1: Distribution of age and gender among patients.

Age	Males	Females	Total
0-10	1 (1.9%)	0 (0%)	1 (1.2%)
11-20	20 (37.7%)	14 (42.4%)	34 (39.5%)
21-30	18 (34%)	11 (33.3%)	29 (33.7%)
31-40	6 (7%)	3 (9.1%)	9 (10.5%)
41-50	4 (7.5%)	3 (9.1%)	7 (8.1%)
51-60	3 (5.7%)	1 (3%)	4 (4.7%)
≥61	1 (1.9%)	1(3%)	2 (2.3%)
Total	53 (61.6%)	33 (38.4%)	86 (100%)

The most common cause of pancytopenia in the present study was megaloblastic anemia in 26(40.2%), followed by aplastic anemia in 16(18.6%) of the cases. Tuberculosis was the cause in 9(10.5%) of the patients while malignancy was the cause in 7(8.1%) of the patients. The other causes observed were alcoholic liver disease in 5(5,8%), malaria in 4(4.7%), Rheumatoid arthritis in 4(4.7%), Multiple myeloma, acute myeloid leukemia and septicemia in 3(3.5%) each, and dengue in 6(7%) of the patients (Figure 1).

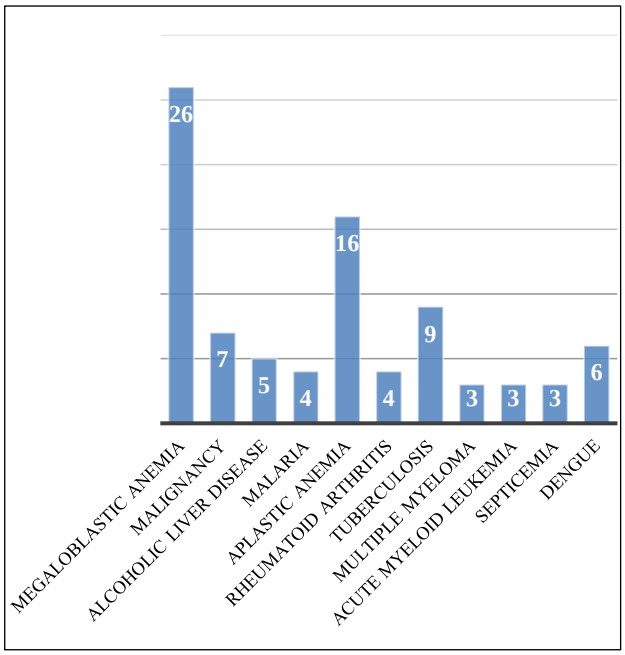

Figure 1: Causes of pancytopenia.

The most common symptom among all the patients was fatigue, which was seen in 62 (72.1%) patients, followed by dyspnea in 37 patients (43%), and fever in 35 patients (40.7%).

Among 21 patients (24.4%) had bleeding, 17 had weight loss (19.8%), 11 had abdominal pain (12.8%) and 9 had leg pains(10.5%). Jaundice was seen in 7 (8.1%) patients. (Figure 2).

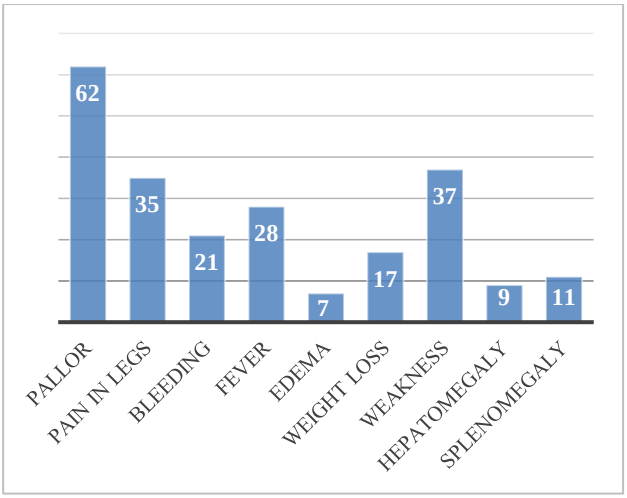

Figure 2: Sign and symptoms of pancytopenia.

DISCUSSION

There are only a few studies regarding the incidence of pancytopenia in patients, more so less in India. It is a striking feature of many transient or life threatening diseases.[8] Pancytopenia is not a disease by itself but is a manifestation of various conditions resulting in decreased cellular components, thereby causing anemia, leucopenia and thrombocytopenia.

The evaluation of pancytopenia starts from history, physical examination and basic haematological, biochemical, radiological, bone marrow aspiration and biopsy. Although it is invasive, it is a very simple procedure with only slight discomfort to the patients and is done fairly regularly. Bone marrow aspiration is usually done for the estimation of unexplained cytopenia and malignant conditions such as leukemia, staging of a neoplasm as well as storage disorders. Trephine biopsy is usually done when there is a suspicion of hypoplasia, aplasia or dry aspiration, granulomatous conditions, lymphomas and malignancies.[8]

IN the present study, the number of males was higher than that of the females with a male to female ration of 1.6:1. A study by Prasad et al reported males to be slightly more affected than females corroborating our study.[9] A male to female ratio of 1.7:1 was reported by Dasgupta et al, and 1.38 reported by Makheja et al, 1.2: 1 by Khunger et al, as well as by Agarwal et al.[10-13]

Most of the patients affected were between 11-30 years of age, with the youngest and the elderly being least affected. In a similar study by Agarwal et al, 1-30 years of age was found to be the most common age group to be affected.[13] Similar age group was reported in other studies by Khunger et al, Tilak et al, Khodke et al and Jha et al.[12,14-16]

The most common aetiology of pancytopenia in the present study was megaloblastic anemia in 40.2%, followed by aplastic anemia in 18.6% and tuberculosis in 10.5% of the patients. The incidence of megaloblastic anemia was found to be ranging from 39% to 72% in some studies and was reported as the commonest cause of pancytopenia in accordance to our study, however, in some other studies by Kumar et al and Memon et al, it was found to the second common cause.[12,14,17,18] Low socioeconomic conditions and nutritional deficiency of either B12 or folate was attributed to this cause.

Out of 30% of the patients in a study by Agarwal et al had malaria as a cause for pancytopenia and a similar case was found by Tareen et al and Gamal et al in their respective study In studies by Prasad et al, pancytopenia due to malaria was reported to be fatal.[9,19,20] The higher incidence of malaria in cases of pancytopenia was attributed to the endemic nature of the disease.[13] The most common cause of pancytopenia reported globally was aplastic anemia. It had been reported that globally the incidence varies between 10% to 52.7%.[14,19] However in our study it was only the second highest. Similar results were reported by other authors in various studies.[12,13,15] Aplastic anemia causes failure of haematopoesis. The cause is proposed to be immune mediated resulting in destruction of the blood forming cells by lymphocytes. Chemicals or drugs in the environment are said to be the cause of the errant immune system.[12]

Fatigue (72.1%), Dyspnea (43%) and fever (40.7%) were the chief complaints among the patients with pancytopenia in the present study. Bleeding (24.4%), abdominal pain(12.8%), and weight loss (19.8%) also was observed in considerable few. Fever was the most common presentation in a study by Agarwal et al, followed by pain in the legs and weakness. Bleeding tendencies were also seen in over 34% of the cases in their study.[13] Khodke et al, also reported fever, followed by weakness to be the most common symptoms.[15]

CONCLUSION

Patients who have unexplained anemia, prolonged fever and bleeding tendency should be suspected to have pancytopenia. Investigations such as complete haemogram, bone marrow biopsy were very useful in diagnosing the disease. Early identification of this disease would help in early planning for management thereby improving the survival rates.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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