JK SCIENCE pISSN: 0972-1177

ORIGINAL ARTICLE

Clinicopathological Analysis of Pancytopenia-A Tertiary Care Centre Study

Bharti Devi Thaker, Anu Gupta, Rashmi Aithmia

Abstract

Background: Pancytopenia is itself not a disease ; it however is the combination of presence of anaemia, leucopenia and thrombocytopenia due to a variety of underlying disorders. Bone marrow aspiration and biopsy is an important investigation to differentiate bone marrow disorders. **Aim-** To study the clinicohaematological profile and various underlying etiologies of pancytopenia **Material and method-** A retrospective study was done in the department of pathology GMC Jammu over a period of 2 years(2019 to 2021). Data regarding clinical details ,peripheral blood film and bone marrow findings were collected from 182 patients fulfilling the criteria of pancytopenia. **Result-** Out of total 182 cases of pancytopenia,100 (54.9%) were females and males were 82(45.05%). Male to female ratio was 1.21:1. The most common clinical presentation was pallor seen in 82 cases (45.05%). The major presentation of the patients with pancytopenia was megaloblastic anaemia which comprised of 82 (45%) of cases. This was followed by hypoplastic / Aplastic marrow 22(12.8%), Dual deficiency anaemia 14 (7.6%), Dilute/ inadequate marrow cases were 12 (6.6%), Acute myeloid leukemia 12(6.6%), Acute lymphoblastic leukemia 9 (4.9%),Miscellenous causes 9 (4.9%) , Iron deficiency anemia 7(3.8%), Lymphoma 4 (2.1%), Multiple myeloma 4 (2.1%), Myelodysplastic syndrome 2 (1.09%), Metastatic solid tumour 2 (1.09%) , kala azar 2(1.09%),Transient erythroblastopenia of childhood 1(0.54%) , Marrow necrosis 1(0.54%) and myelofibrosis 1(0.54%). **Conclusion-** The present study concluded that most of cases of pancytopenia had underlying reversible etiology. Therefore complete workup of patient with haematological and bone marrow examination will lead to early diagnosis that in turn will be helpful in efficient management of these patients.

Key Words

Pancytopenia, Aplastic Anaemia, Thrombocytopenia

Introduction

Cytopenia is a reduction in the number in any of the three types of peripheral blood cell. Pancytopenia is the simultaneous presence of anaemia, leucopenia and thrombocytopenia.[1] The patient usually presents with symptoms attributable to anaemia or thrombocytopenia with leucopenia being an uncommon cause of the initial presentation . Sometimes it is detected as an incidental feature in a patient presenting with disorder capable of depressing the levels of all cellular elements in blood . [2] The underlying mechanism may vary from reduced production of haematopoietic cells , ineffective erythropoiesis, marrow replacement or infiltration by abnormal or malignant tissue as well as by trapping of normal cells in hypertrophied reticuloendothelial system.[3] Pancytopenia is a feature of many serious and life threatening diseases. However the etiology of

PG Department of Pathology, Government Medical College Jammu-J&K India.

Correspondence to: **Dr. Anu Gupta, Lecturer Department of Pathology, Government Medical College, Jammu (J&K), India.**

Manuscript Received: 3.9. 2021; **Revision Accepted**: 3.12.2021;

Published Online First: 10 July 2022

Open Access at: https://journal.jkscience.org

Cite this article as: Thaker BD, Gupta A, Aithmia R. Clinicopathological Analysis of Pancytopenia-A Tertiary Care Centre Study. JK Science 2022;24(3):167-71

pancytopenia cases varies from one geographical region to another. [4] In developing countries like India common aetiologies found are megaloblastic anemia, infections ,drugs, hypersplenism and aplastic anemia. [5] Megaloblastic anemia has been found to be the most common cause of pancytopenia worldwide. Nutritional factors, recurrent infections and Vit B 12 and folate deficiencies seem to be strongly associated with it.[6]

Out of the tests , a detailed history of the patients, general physical examinations and complete blood picture with peripheral blood smear are essential for the diagnosis of this disorder.Apart from peripheral blood smear ,another test essential for detection of pancytopenia is bone marrow examination and trephine biopsy. These two procedures complement each other and help in the diagnosis of underlying haematological and non haematological disorders.[7,8]

As there is difference in underlying etiologies of pancytopenia in different geographical areas, we conducted this study in our department to find out the causes along with the bone marrow morphology in cases of pancytopenia. This would in addition further help in better diagnostic approach as well as management of these patients.

Aim- To study the clinicohaematological profile and various underlying etiologies of pancytopenia in patients

Material and Methods

A retrospective study was conducted in Department of Pathology GMC J ammu over a period of 2 years from year 2019 to 2021. Clearance from Institutional Ethical Clearence was taken vide file no IEC/GMC/Cat C/ 2021/512 dated 17 .04.2021. All the information i.e clinical and haematological parameters were gathered from the archives in bone marrow section of department of pathology GMC Jammu.

Inclusion Criteria- Patients with Pancytopenia (haemoglobin < 10 gm/dl, Total leucocyte count of <4000/ cumm , Platlet count of <1 lakh/cumm).[9]

Exclusion Criteria- Patients on radiotherapy and chemotherapy.

Patients already being treated with blood and blood products.

A written consent after explaining the risk and complications of the procedure was taken in all cases. Bone marrow aspiration was done from posterior iliac spine in each case of pancytopenia fulfilling the inclusion criteria using salah needle under local anaesthesia taking all aseptic precautions. Bone marrow smears were prepared immediately following aspiration and after air drying were stained with May Grunwald Giemsa stain. Perls stain was done in all cases. Bone marrow trephine biopsy followed by special stains were done wherever indicated Periodic acid Schiff (PAS), Sudan Black B (SBB) and Myeloperoxidase(MPO) was done wherever required.

Result

A Total of 182 cases were studied. Out of these 100 (54.9%) were females and males were 82(45.05%). The mean age of patient was 30 years . Age range was from 3 years to 80 years. Male to female ratio was 1.21:1. *Table 1*

The maximum number of cases were seen in first two decades; between age group 10 to 19 years (25.2%) followed by those less than 10 years of age(15.5%). This was followed by patients in the age group of 20-29years (14.2%),40-49 years (13.3%). Least number of cases were seen after 70 years (5.5%).*Table 2.*

The most common clinical presentation was pallor 82(45.05%), followed by loss of weight 54(29.6%), fever42(23.1%), generalised weakness30 (16.4%), splenomegaly 26 (14.2%), bleeding 22(12.08%), lymphadenopathy 13(7.1%), hepatomegaly 8(4.39%) and chills and rigors 7(3.84%).*Table 3*

The major presentation of the patients with pancytopenia was megaloblastic anaemia which comprised of 82 (45%) of cases. This was followed by hypoplastic / Aplastic marrow 22(12.8%), Dual deficiency anaemia 14 (7.6%), Dilute/inadequate marrow cases were 12 (6.6%), Acute myeloid leukemia 12(6.6), Acute lymphoblastic leukemia 9 (4.9%), Miscellenous causes 9 (4.9%), Iron deficiency anemia 7(3.8%), Lymphoma 4 (2.1%), Multiple myeloma 4 (2.1%), Myelodysplastic

Table 1Sex Distribution

Sex	No of patients (n=182)	%age of patients
Females	**100**	**54.9**
Males	**82**	**45.05**

Table 3-Clinical Features

Clinical Features	No.of Patients (n)	Percentage(%)
Pallor	82	45.05
Loss of weight	54	29.6
Fever	42	23.1
Generalised weakness	30	16.4
Splenomegaly	26	14.2
Bleeding	22	12.08
Lymphadenopathy	13	7.1
Hepatomegaly	8	4.39
Lymphadenopathy	7	3.84

Fig 1 Bone marrow examination show presence of leishmana donovonian body in a marrow bit (MGG 100x)

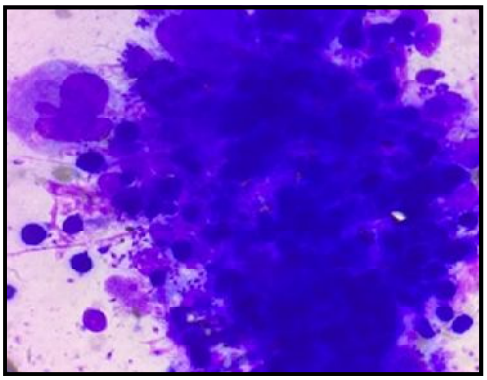
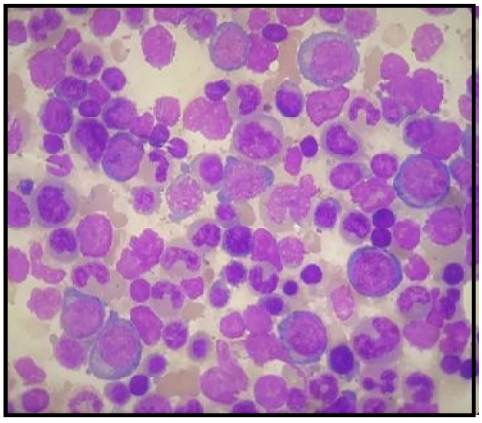


Fig 2. Bone marrow examination show erythroid hyperplasia with megaloblastic erythroblast . (MGG 100x).



syndrome 2 (1.09%), Metastatic solid tumour 2 (1.09%) , kala azar 2(1.09%),Transient erythroblastopenia of childhood 1(0.54%) , Marrow necrosis 1(0.54%) and myelofibrosis 1(0.54%). *Table 4.*

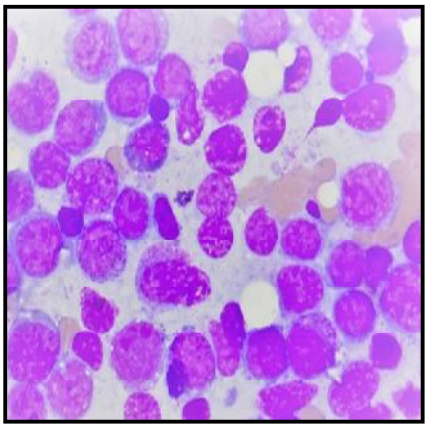
Table 2 Age Distribution

Age(years)	No. of patients (n=182)	% in each group
<10	28	15.5
10-19	46	25.2
20-29	26	14.2
30-39	18	9.9
40-49	24	13.3
50-59	16	8.7
60-69	14	7.7
>70	10	5.5

Table 4:.Etiological breakup of 182 cases of pancytopenia

Etiology	No. of patients (n=182)	%age of patients
Vitamin B12 deficiency/Megaloblastic anemia	82	45
Hypoplastic/Aplastic marrow	22	12.8
Dual deficiency anaemia	14	7.6
Diluted/Inadeqate marrow/no valid opinion possible	12	6.6
Acute myeloid leukemia	12	6.6
Acute lymphoblastic leukemia	9	4.9
Miscellenous	9	4.9
Iron deficiency anemia	7	3.8
Lymphoma	4	2.1
Multiple Myeloma	4	2.1
Myelodysplastic syndrome	2	1.09
Metastatic solid tumour	2	1.09
Transient eyrthroblastopenia of childhood	1	0.54
Marrow necrosis	1	0.54
Myelofibrosis	1	0.54

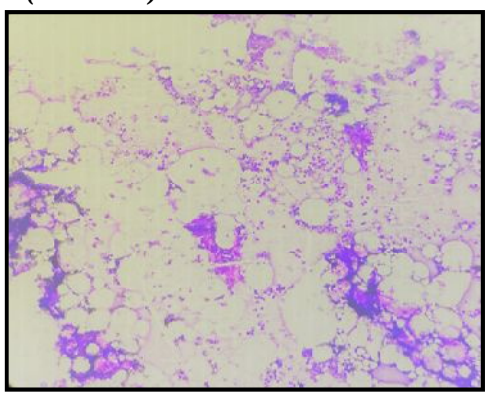
Fig 3. Bone marrow aspirate smear in case of AML (MGG 100x)



Discussion

Pancytopenia is one of the common conditions seen in our day to day practice . It is not a disease but combination of a triad representing many underlying disorders. A total of 182 cases were studied ,out of these 100 (54.9%)

Fig 4- Bone marrow aspirate smear in Aplastic anaemia show reduced cellularity with increased fat in a paediatric patient . (MGG 40x).



were females and males were 82(45.05%). The mean age of patient was 30 years . Age range was from 3 years to 80 years. Male to female ratio was 1.21:1. Paul *et al* [10] al also found male patients to be more common than females with a Male:Female ratio of 1.3:1 . Age range of patient was 2-85 years ; similar to our study. Khodke *et al* [11] in his study conducted on 50 cases found male predominance with male: female ratio of 1.3:1. This could be due to cultural and social systems in our area making male population to visit health care facilities more readily as compared to females .However in contrast female preponderance of 54.28% was seen in a study done by Agarwal *et al* . [12]

The maximum number of cases were seen in first two decade; between age group 10 to 19 years (25.2%) followed by those less than 10 years of age(15.5%). Nutritional deficiency anaemia was found to be the most common etiology in children including megaloblastic anaemia and dual deficiency anaemia thereby emphasising the need of proper nutrition availability .This was followed by patients in the age group of 20-29years (14.2%),40-49 years (13.3%). Least number of cases were seen after 70 years (5.5%). Tilak *et al* [13] found maximum number of cases in patients <20 years whereas Khodke *et al* [11] found majority of cases between 12-30 years of age. Gaythri *et al* [14] found 29.8% were of paediatric age range and megaloblastic anemia was found to be the commonest cause of pancytopenia . Whereas Yadav *et al* [15] found maximum number of patient between 20 to 35 years followed by 35 -50 years with Vit B12 deficiency the most common cause.

The most common clinical presentation was Pallor 82(45.05%), followed by loss of weight 54(29.6%), fever 42(23.1%), generalised weakness30 (16.4%), splenomegaly26 (14.2%), bleeding 22(12.08%). Pallor (73.2%) was found to be the most common symptom followed by loss of weight (62.5%) in a study done by Jella R *et al.*[16] This was corroborated by Yadav et al (15) who also found pallor to be the most common symptom followed by fever. Whereas in a study by Santra *et al* [17] most common presenting complaints were weakness (68.2%) followed by fever (47.7%) and bleeding manifestation was presenting complaints in (33.7%)of cases.

The major presentation of the patients with pancytopenia was megaloblastic anaemia which comprised of 82 (45%) of cases. This was followed by cases with hypoplastic / Aplastic marrow 22(12.8%), Dual deficiency anaemia 14 (7.6%), Dilute/inadequate marrow 12 (6.6%), Marrow necrosis 1(0.54%) and myelofibrosis seen in 1(0.54%) patient only.

Reddy *et al* [18] similar to our study found megaloblastic anemia (38.1%) to be the most common cause. Khugner *et al* [9] found megaloblastic anaemia followed by aplastic anemia to be the most common cause similar to our study. Jella *et al* [16] found megaloblastic anemia followed by aplastic anemia to be the most common cause of pancytopenia . Cancer was seen in 3.6% cases and Multiple Myeloma in 1.8% cases. Batool Y *et al* [19] found megaloblastic anemia(27%) to be the most common cause followed by aplastic anaemia(15.6%) and acute leukemia(13.1%).Jha *et al* [20] in Nepal studied 148 cases and found hypoplastic marrow in 29% , megaloblastic anemia 23.6%, Haematological malignancy 23.6% . However Hamid *et al* [21] found malaria followed by hypersplenism to be the most common cause . The high prevalence of megaloblastic anemia correlates with the high prevalence of nutritional anaemias in developing countries like ours .

Among 9 miscellenous cases in our study, three were pregnant females, one had a history of passing worms and two each case was suffering from inflammatory bowel disease and chronic renal failure. These cases didn't turn up for further investigation after their initial peripheral blood examination. All these cases showed a dimorphic blood picture therefore pancytopenia was probably due to underlying nutritional deficiency , thus further emphasising the burden of nutritional anemia in our area.

Conclusion

Majority of patient of pancytopenia in our study had reversible etiology Complete workup of patient with haematological and bone marrow examination will lead to early diagnosis as well as help clinicians in planning further investigations and management of these cases.

Financial Support and Sponsorship
Nil.

Conflicts of Interest
There are no conflicts of interest.

References

1. Kar M, Ghosh A. Pancytopenia . J Indian Acad Clin Med 2003;3(1);29-34 .
2. Mahapatra M ,Pancytopenia;Aplastic anaemia,in: Saxena R,Pati HP,Mahapatra M(eds). De Gruchy Clinical Haematology in Medical practice .6th adapted ed, Blackwill, India,2013:pp106-19.
3. Jain A, Nanidadekar M. An etiological appraisal of pancytopenia-Largest series reported to date from a single tertiary care teaching hospital. BMC Haemotology 2013;13(1):1-9.
4. Niazi M, Fazl-i-Razia.The incidence of underlying pathology in pancytopenia-an experience of 89 cases.J Postgrad six year study. J Postgrade Med Inst 2004;18: 76-79.
5 . Khan SP,Geelani S, Khan FP,Ali N,Akhter S, Shah S, *et al*. Evaluation of pancytopenia on bone marrow aspiration - study at a tertiary care center in Kashmir valley,India. Intl J Adv Med 2018;5:946-49.
6 . Khalid G,Moosani MA,Ahmed L,Farooqi N. Megaloblastic anemia seen in 48 cases of pancytopenia. Ann Abbasi Shaheed Hosp Karachi Med Dent Coll 2005;10(2):742-44.
7 Peterson LC, Sandhaus LM, Spier CM, Ward PCJ. Physician Review of the peripheral blood smear: when and why .2001.Laboratory Haematology 7:175-79.
8. Barrie S, General stains ,in: Crocker J, Burnet D (eds);The science of laboratory diagnosis.2nd Edition, Wiley, England 2005:pp17-25.
9. Khunger JM, Arunselvi S, Sharma U. Pancytopenia - A Clinicohaematological study of 200 cases .Ind. J Pathol Microbio 2002;45(3):375-79.
10. Paul JS,Sheeja S,Sankar S. Pancytopenia- A clinicohaematological study. J Evolution Med Dent Sci 2018;7(16):1784-88.
11. Khodke K, Marwah S, Buxi G,Yadav RB, Chaturvedi NK. Bone marrow examination in case of pancytopenia . J Indian Aca Clin Med 2001;2:55-59.
12 . Agarwal R, Bharat V, Gupta BK, Jain S,Ansal R,Choudhary A,Tiwari G.Clinical and haematological profile of pancytopenia.Intl J Biochem Res 2015;2(1):45-48.
13. Tilak V, Jain R. Pancytopenia -a clinicohaematologic analysis of 77 cases. Ind J Pathol Microbiol 1999;42:299-404.
14 Gayathri BN, Rao KS.Pancytopenia : A Clinicohaematological study . J Lab . Physicians 2011,3(1):15-20.
15 Yadav RK,Kumar S.Clinicohaematological profile of pancytopenia: a study from a tertiary care hospital .Intl J Adv Med 2020;7:478-81.
16. Santra G, Das BK. A cross sectional study of the clinical profile and aetiological spectrum of pancytopenia in a tertiary care center. Singapore Med J 2010;51(10):806-12.
17. Jella R, Jella V. Clinicohaematological analysis of pancytopenia . Intl J Advances in Med 2016;3(2):176-79.
18 . Reddy GPK, Mallikarjuna Rao KV. Clinical features and risk factors of pancytopenia : a study in tertiary care hospital. Intl J Adv Med 2016;3(1):68-72.
19. Batool Y,Fatima S, Akhter N,Asif M, Pervaiz M, Habiba U. A clinicohaematological evaluation of pancytopenia : A retrospective study. Isra Med J 2021;3(2):96-100.
20. Jha A, Sayami G, Adhikari RC , Panta AD. Bone marrow examination in case of pancytopenia .JNMAJ Nepal Med Assoc 2008;47:12-17.
21. Hamid G , Shukry S.A.R. Patterns of pancytopenia in Yemen. Turk J Haematol 2008;25:71-74.