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Research Article

Clinico-etiological spectrum of pancytopenia in hospitalized children

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ABSTRACT

Background: Pancytopenia is not uncommon in children, having multiple cause varying from transient marrow suppression to leukaemia. There is little discussion regarding pancytopenia in pediatric population especially in South East Asia.
Methods: It was a cross-sectional, observational study GSVM Medical College, Kanpur, UP, India from January 2011 to august 2012. All patients admitted between 1-18 years age group presenting with pancytopenia were included for the study. A detailed clinical history and physical examination was done. Bone marrow examination (aspiration) to confirm a particular etiology / or to support a diagnosis.
Results: Incidence of Pancytopenia was 2.9% , Most of the patients (30.5%) were in the 13-15 years age group. The common causes were megaloblastic anemia (47%), aplastic anemia (25.8%) and leukemia (17.6%). Common clinical presentation was pallor (81%), fever (68%) and petechial haemorrhages (51%).
Conclusions: Pancytopenia is a common medical condition in children, the mean age of presentation being 10.63±4.60 years. There should be high index of suspicion for pancytopenia and early intervention should be done as most the cases are preventable.

Keywords: Children, Megaloblastic anemia, Pancytopenia, Preventable

INTRODUCTION

Pancytopenia is a common medical condition in children characterized by reduction in all the cellular elements of the peripheral blood lineages: leukocytes, platelets, and erythrocytes.[1] There are multiple causes of pancytopenia varying widely in children, ranging from transient marrow viral suppression to marrow infiltration by life-threatening malignancy. Peripheral Pancytopenia requires microscopic examination of a bone marrow biopsy and a marrow aspirate to assess overall cellularity and morphology. Although pancytopenia is a common clinical finding with extensive differential diagnosis, there is a relatively little discussion of this abnormality in literature and there is the lack of data on pancytopenia in pediatric age group, especially with regards to clinical and etiological findings, in South-East Asia.

METHODS

It was a cross-sectional, observational study carried out in the Department of Pediatrics, Children hospital, GSVM Medical College, Kanpur, UP, from January 2011 to august 2012. We included All patients admitted in children hospital between 1-18 years age group presenting with pancytopenia.[2] We excluded all children less than 1 year and more than 18 years of age, already diagnosed cases of aplastic anemia and leukemia, those having history of recent blood transfusion and those who had not given consent for the study. A detailed clinical history and physical examination was performed in each

case. After the blood counts showed pancytopenia, following investigations were done additionally namely: GBP (General Blood Picture), reticulocyte count, liver profile, HIV-1 and 2, bleeding profile and bone marrow examination (aspiration) to confirm a particular etiology / or to support a diagnosis. A written, informed consent from parents and clearance from Institutional Ethics Committee (Human Studies) was obtained prior to the start of the study.

RESULTS

During the study period of 20 months total number of admissions in the children hospital in the age group 1-18 were 5862 and total number of pancytopenia cases were 170 making the incidence 2.9%. There were 80 (47.0%) males and 90 (53%) females, with male: female of 0.88:1. Maximum number of patients 52 (30.5%) were in the 13-15 years age group, followed by 40 (23.5%) in the 7-9 year group and the least number 12 (7%) in the 4-6 years age group. Most of the cases i.e. 142 (83.5%) were Hindus while rest 28 (16.5%) were Muslims. About two-third i.e. 108 (63.5%) patients of pancytopenia in the study were from rural background while one third i.e. 62 (36.5%) were from urban population. The most common etiology that came out in bone marrow aspiration smears was megaloblastic anemia (n=80, 47% cases), followed by aplastic anemia (n=44, 25.8%) and leukemia (n=30, 17.6%). Bone marrow was normal in 12 (7%). Malaria was also found in 4 cases (2.3%). Most common clinical presentation was pallor (n=137, 81%), fever (n=116 68%), and petechial hemorrhages (n=86, 51%) and other features included hepatomegaly (44.8%), splenomegaly (37.2%), lymphadenopathy (22.5%) and bony tenderness.

Table 1: Age and gender wise distribution of children.

Age group (years)	Males (n=80)		Females (n=90)		Total (n=170)	
	No	%	No	%	No	%
1-3	10	12.5	6	6.6	16	9.4
4-6	2	2.5	10	11.1	12	7
7- 9	24	30	16	17.7	40	23.5
10-12	22	27.5	6	6.6	28	16.4
13-15	14	17.5	38	42.2	52	30.5
16-18	8	10	14	15.5	22	12.9
Total	80	100	90	100	170	100

Chi-square = 29.30; p<0.001 highly significant.

Table 2: Religion and location wise distribution of children.

Parameters	Religion		Location	
	Hindu	Muslim	Rural	Urban
Number of cases	142	28	108	62
Percentage	83.5	16.5	63.5	36.5

Table 3: Etiological profile of pancytopenia children.

Etiology	Number	Percentage (%)
Megaloblastic anemia	80	47%
Aplastic anemia	44	25.8%
Leukemia	30	17.6%
Normal bone marrow	12	7%
Malaria	04	2.3%
Total	170	100%

Table 4: Clinical presentations of pancytopenia children.

Clinical Presentation	Number	Percentage (%)
Pallor	137	81%
Fever	116	68%
Petechial haemorrhage	86	51%
Hepatomegaly	72	44.8%
Splenomegaly	64	37.2%
Lymphadenopathy	38	22.2%
Bony tenderness	30	17.6%

DISCUSSION

Peripheral pancytopenia is not a disease by itself; rather it describes simultaneous presence of anemia, leucopenia and thrombocytopenia resulting from a number of disease processes. The variation in the pattern of disease has been attributed to differences in methodology and stringency of diagnostic criteria and other demographic parameters. The incidence and prevalence of pancytopenia has not been calculated in India, so far. In our study the incidence of pancytopenia was 2.9% among all the admitted patients. Tilak et al, found the incidence to be 374 per million hospital attendance per year.[3] This major difference in our study is due to different group of population selected.

There is no significant difference in incidence between males and females in our work. This is in accordance with the other studies whereas Jain et al, Kumar et al, both from India and Jalbani et al, from Pakistan found a higher incidence in males.[3-7] This male predominance in previous studies could be due to social / cultural taboos in our society, making health care facilities more readily available to males as compared to females leading to increased male presentation at hospitals especially in rural areas.

Most of the patients 52 (30.5%) were adolescents in the 13-15 years age group with the mean age of presentation being 10.63±4.60 years. Not much studies has subdivided pediatric population but studies have shown to be higher incidence amongst adolescents in pediatric population of less than 20 years.[5,8] Gupta et al, in their study of pancytopenia exclusively in children found mean age to be 8.6 years.[9] In the current study, about 83.5% cases were Hindus while rest 16.5% were Muslims, and about two-third were from rural background. This could

be the reflection of the population distribution in local area.

The commonest cause of pancytopenia was megaloblastic anemia (47%) followed by aplastic anemia (25.8%) and leukemia (17.6%) of cases. The incidence of megaloblastic anemia varies from 0.8% to 32.26% of all the pancytopenia patients.[10-12] Ayub et al, in his study from Pakistan found megaloblastic anemia as the most prevalent diagnosis and the major cause of bicytopenia and pancytopenia in pediatric unit.[13] In another study from Pakistan by Memon et al, on 230 pancytopenia children found the most common causes of pancytopenia as aplastic anemia, megaloblastic anemia, leukemia and infections.[14] In studies from India in patients of all age group Tilak et al, and Kumar et al, found megaloblastic anemia in 68% and 37% of all pancytopenia patients.[3,6] A study from Zimbabwe found megaloblastic anemia to be the most frequent cause, followed by aplastic anemia and acute leukemia.[15] Gupta et al, reviewed 105 children aged 1.5-18 years with pancytopenia found aplastic anemia was the most common cause of pancytopenia (43%), followed by acute leukemia (25%).[9] Megaloblastic anemia was seen in 6.7% children by them. Bhatnagar et al, in their retrospective study on pediatric patients presenting with pancytopenia, found megaloblastic anemia (28.4%) as the single most common cause followed by acute leukemia and infections in 21% patients each, and aplastic anemia in 20% cases. We found malaria in only 4 cases (2.3%).[16] Gupta et al, found infection to be third most common cause of pancytopenia of which kala azar was the most common.[9] Bhatnagar et al, found enteric fever to be most common cause amongst all infectious etiology.[16] Memon et al, found malaria in 8.69% and enteric fever in 10.8% of cases.[14] Study from Zimbabwe found acquired immune deficiency to be a common cause.[15] Malaria related cytopenia was also noted in other studies. [17,18] In 7% of the cases no cause could be identified. In study by Memon et al, 4% cases remained undiagnosed whereas Jha et al, were able to establish diagnosis in only 77% of cases.[8,14]

In our study more than half of the cases had pallor, fever and petechial hemorrhages at presentation. Other features included hepatomegaly, splenomegaly, lymphadenopathy and bony tenderness. In a study on Chinese children pale face was the most common clinical manifestation (147 cases, 84.5%), followed by bleeding (87 cases, 50%) and fever (41 cases, 23.6%).[19] Common clinical presentations in other studies were pallor, fever, petechial hemorrhages, visceromegaly and bleeding from nose and gastrointestinal tract and bone pain.[14,20]

CONCLUSION

Pancytopenia is a common hematological problem in pediatric population, encountered in clinical practice. Most common clinical presentation is pallor, fever and petechial hemorrhage. Incidence of hepatomegaly, splenomegaly and lymphadenopathy are also common. Nearly 50% of the cases are due to megaloblastic anemia, which is a preventable cause. Other Usual causes are aplastic anemia, leukemia and malaria. Detailed work up should be done based on the clinical features and there should be high index of suspicion, as most the cases (nutritional and infectious) are preventable.

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REFERENCES

1. Bates I, Bain BJ. Approach to diagnosis and classification of blood diseases. In: Lewis SM, Bain BJ, Bates I, editors. Dacie and Lewis.
2. Freedman MH, Nelson Textbook of Paediatrics 19th edition, South East Asia; Elsevier Academic Press Ltd. 2011:1684.
3. Tilak V, Jain R. Pancytopenia a clinico-hematologic analysis of 77 cases. Indian J Pathol Microbiol. 1999;42(4):399-404.
4. Khunger JM, Arunselvi S, Sharma U, Ranga S, Talib VH. Pancytopenia a clinicohematological study of 200 cases. Indian J Pathol Microbiol. 2002,45:375-9.
5. Jain A, Naniwadekar M. An etiological reappraisal of pancytopenia – largest series reported to date from a single tertiary care teaching hospital. BMC Hematol. 2013;13(1):10.
6. Kumar R, Kalra SP, Kumar H, Anand AC, Madan H. Pancytopenia – a six year study. J Assoc Physicians India. 2001:49:1078-81.
7. Jalbani A, Ansari IA, Chutto M, Gurbakhshani KM, Shah AH. Proportion of megaloblastic anemia in 40 patients with pancytopenia at CMC hospital Larkana. Medical Channel. 2009;15:34-7.
8. Jha A, Sayami G, Adhikari RC, Panta AD, Jha R. Bone marrow examination in cases of pancytopenia. J Nepal Med Assoc. 2008;47(169):12-7.
9. Gupta V, Tripathi S, Tilak V, Bhatia BD. A study of clinico-haematological profiles of pancytopenia in children. Trop Doct. 2008;38(4):241-3.
10. Incidence of aplastic anemia. the relevance of diagnostic criteria. By the International Agranulocytosis and Aplastic Anemia Study. Blood. 1987;70(6):1718-21.
11. Keisu M, Ost A. Diagnoses in patients with severe pancytopenia suspected of having aplastic anemia. Eur J Haematol. 1990;45(1):11-4.
12. Varma N, Dash S. A reappraisal of underlying pathology in adult patients presenting with pancytopenia. Trop Geogr Med. 1992;44(4):322-7.
13. Ayub T, Khan FR. Prevalence of megaloblastic anaemia in a paediatric unit. Gomal J Med Sci. 2009;7(1):62-4.
14. Memon S, Salma S, Nizamani MA. Etiological spectrum of pancytopenia based on bone marrow

examination by children. J Coll Physicians Surg Pak. 2008;18:163-7.
15. Savage DG, Allen RH, Gangaidzo IT, Levy LM, Gwanzura C, Moyo A, et al. Pancytopenia in Zimbabwe. Am J Med Sci. 1999;317:22-32.
16. Bhatnagar SK, Chandra J, Narayan S, Sharma S, Singh V, Dutta AK. Pancytopenia in children: etiological profile. J Trop Pediatr. 2005;51(4):236-9.
17. Latger-Cannard V, Bibes B, Dao A, Fohlen-Walter A, Buisine J, Rabaud C, et al. Malaria-related cytopenia. Ann Biol Clin (Paris). 2002;60(2):213-6.
18. Aouba A, Noguera ME, Clauvel JP, Quint L. Haemophagocytic syndrome associated with plasmodium vivax infection. Br J Haematol. 2000;108(4):832-3.
19. Wu J, Cheng YF, Zhang LP, Liu GL, Lu AD, Jia YP, et al. Clinical features and etiological spectrum in children with pancytopenia. Zhongguo Dang Dai Er Ke Za Zhi. 2011;13(9):718-21.
20. Naseem S, Varma N, Das R, Ahluwalia J, Sachdeva MU, Marwaha RK. Pediatric patients with bicytopenia/pancytopenia: review of etiologies and clinico-hematological profile at a tertiary center. Indian J Pathol Microbiol.2011;54(1):75-80.

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