ORIGINAL ARTICLE

# DISTRIBUTION OF APLASTIC ANEMIA IN CHILDREN HAVING NEW-ONSET PANCYTOPENIA

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## ABSTRACT

**Background:** Pancytopenia is a common problem in clinical and haematological practice in pediatrics. A vast majority of diseases may present with pancytopenia. The clinical manifestations are usually attributable to anemia, leucopenia or thrombocytopenia, which may manifest clinically as pallor, infections or bleeding problems respectively. It is very important to know the common causes of pancytopenia in children, as some of them are completely curable while others can be treated to reduce morbidity and to prolong survival.

**Material & Methods:** This was discripative cross-sectional study, conducted in Department of Pediatric, Hayatabad Medical Complex, Peshawar. A total of 168 patients presented with new onset pancytopenia on peripheral blood smear were included in the study.

**Results:** There were 102(60.71%) males and 66(39.29%) females. Male to female ratio was 1.60:1. Average age of the patients was 7.46 years ±3.8SD with range 2 months - 15 years. The aplastic anemia was found in 57(33.93%) patients.

**Conclusion:** Pancytopenia is more common in males than females. Aplastic anemia is a common finding of pancytopenia in this part of world in the specific age group.

**KEY WORDS:** Aplastic Anemia; Pancytopenia; Hematemesis; Anemia.

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## INTRODUCTION

Aplastic anemia is a hematologic condition that results in pancytopenia and is characterized by bone marrow hypoplasia or aplasia. It is a severe disease caused by medications, chemicals and environmental factors. Bone marrow transplants have increased the survival rate of patients with aplastic anemia. It is costly and most people do not have access to this therapy due to which fatality related to this disease is high.[1]

Some well-founded studies have shown an incidence of aplastic anemia ranging from 1.4 to 14 cases per million people. The rate is even higher in Asian countries. A study conducted in Southern Brazil, from 1999 to 2000, reported an incidence of 2.4 cases per million per year. The variation in incidence among regions is generally thought to be due to environmental, rather than genetic factors.[2]

Pancytopenia on peripheral blood smear with a hypocellular bone marrow is the hallmark of aplastic anemia. It may be inherited/genetic or acquired. Acquired aplastic anaemia has been linked to many drugs, chemicals and viruses. Cytogenetic abnormalities have been reported in acquired aplastic anaemia very rarely.[3]

Pancytopenia is a relatively common hematological entity. It is a striking feature of many serious and life-threatening illnesses, ranging from simple drug-induced bone marrow hypoplasia, megaloblastic anemia to fatal bone marrow aplasias and leukemias. The severity of pancytopenia and the underlying pathology determine the management and prognosis.[4]

Anemia presents with pallor, weakness, easy fatigability and dyspnoea on exertion. Neutropenia results in infections causing sore throat, ulceration of the mouth and pharynx, fever with chills and sweating, chronic skin infection, recurrent chest infection and pneumonia. Thrombocytopenia presents with bleeding manifestations and results in hemorrhage

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into the skin either echymosis or petechiae, epistaxis and bleeding from gums and gastrointestinal tract. Although cerebral hemorrhage is uncommon, it is often fatal.[4, 5]

## MATERIAL AND METHODS

This was a descriptive cross-sectional study, conducted in Department of Pediatrics, Hayatabad Medical Complex, Peshawar from 1st June 2013 to 30th May 2014. A total of 168 patients with 95% confidance level and 7% margin of error under WHO software for sample size determination. Sample technique was consective (non-probability).

All admitted patients with age 2 months to 15 years, of either sex, having new onset pancytopenia on peripheral blood smear were included in the study. Patients un admitted, not willing for Bone marrow examination (BME) and below 2 months and above 15 years, who have already diagnosed as pancytopenia were excluded.

All the patients fulfilling the inclusion criteria were subjected to bone marrow examination for evaluation of the underlying cause. BME included both aspiration and trephine biopsy.

The data was analyzed using SPSS version 13 software computer programme. Mean ± standard deviation were calculated for numerical variables like age. Frequecies and percentages were calculated for categorical variables like aplastic anemia and gender. The results were stratified among age and gender to see the effect modifiers, and were presented in the form of tables.

## RESULTS

A total of 168 patients presenting with new-onset pancytopenia on peripheral blood smear were included in the study. There were 102 (60.71%) males and 66(39.29%) were females. Male to female ratio was 1.60:1.

Average age of the patients was 7.46 years ±3.8SD with range 2months-15years. Patient's age was divided in three categories, out of which most common age group presenting with new-onset pancytopenia on peripheral blood smear was 6-10years. There were 62(36.9%) patients of the age 2months to 5years, 71(42.3%) patients were in the age range of 6-10years, 35(20.8%) were of the age range 11-14 years. (Table 1)

**Table No: 1. Age wise distribution of the patients**

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| 2m-5y | 62 | 36.9 | 36.9 |
| 6y-10y | 71 | 42.3 | 79.2 |
| 11y-15y | 35 | 20.8 | 100.0 |
| Total | 168 | 100.0 | |

The aplastic anemia in patients having new-onset pancytopenia on peripheral blood smear was found in 57(33.93%) patients.

**Table No: 2. Age Wise Distribution of Aplastic Anemia**

| | | Aplastic Anemia | | Total | p-value |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Age | 2m-5y | 18 | 44 | 62 | 0.141 |
| | | 29.0% | 71.0% | 100.0% | |
| | 6y-10y | 30 | 41 | 71 | |
| | | 42.3% | 57.7% | 100.0% | |
| | 11y-15y | 9 | 26 | 35 | |
| | | 25.7% | 74.3% | 100.0% | |
| Total | | 57 | 111 | 168 | |
| | | 33.9% | 66.1% | 100.0% | |

**Table No: 3. Gender Wise Distribution of Aplastic Anemia**

| | | Aplastic Anemia | | Total | p-value |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Gender | Male | 35 | 67 | 102 | 0.519 |
| | | 34.3% | 65.7% | 100.0% | |
| | Female | 22 | 44 | 66 | |
| | | 33.3% | 66.7% | 100.0% | |
| Total | | 57 | 111 | 168 | |
| | | 33.9% | 66.1% | 100.0% | |

Age wise distribution of aplastic anemia shows that aplastic anemia was observed in majority of patients having age 6-10 years. 29% patients have aplastic anemia having age 2months to 5 years, age group 6-10 years contain 42.3% aplastic anemia patients and patients having 11-15 years of age have 25.7% aplastic anemia. (Table 2)

Gender wise aplastic anemia in patients having new-onset pancytopenia on peripheral blood smear shows that gender has no role over them. There were 34.3% aplastic anemia patients in males and 33.3% observed in female patients. (Table 3)

## DISCUSSION

Pancytopenia is not an uncommon haematological problem encountered in clinical practice in pediatrics. It should be suspected on clinical grounds when a patient presents with unexplained pallor, prolonged fever and tendency to bleed. Bone-marrow examination for the evaluation of pancytopenia is a frequently requested investigation. It is one of the most frequent and safe invasive procedures, with little or no risk of bleeding even in the presence of severe thrombocytopenia.[5, 7]

In the present study a total of 168 patients were registered for bone-marrow aspiration for the evaluation of pancytopenia. This finding is comparable to the results of an Indian study in which 250 bone-marrow aspirations performed in a period of six months.[8,9] Similarly in another foreign study, in Nepal out of 940 bone-marrow aspirations performed over a period of 2 years, in 163 (17.34%) cases the indication was pancytopenia.[10]

In this study patients of the specific age groups were included. The youngest was 2months while the eldest was 15years hence the age range was 2 months to 15 years. In other local[11] and foreign[10,12,13] studies similar age ranges of the pancytopenic patients studied, were found.

In this study there was no sex restriction, so we had both male and female patients who presented to us with pancytopenia. There were 60% males and 40% females in this study. The male to female ratio was 1.6: 1. Male predominance is also observed in other studies conducted locally in Peshawar[1, 6] Abbottabad[2] and in studies conducted abroad Nepal[14], India[15] and Yemen.[13]

Out of 168 consecutive cases of pancytopenia that were studied, 57(33.93%) patients were diagnosed as having aplastic anemia. In other reviews the frequency of aplastic anemia varies from 7.7% to 52.7%.[4] Aplastic anemia is a non-malignant but lethal condition, if not managed properly and in time. Epidemiologically it has a pattern of geographic variation opposite to that of leukemias, with higher frequency in the developing world than in the industrialized West. Large prospective studies indicate an annual incidence of two new cases per million populations in Europe and Israel. Its exact incidence in Pakistan is not known due to lack of population based studies. Studies from another 30 cases of pancytopenia at military hospital Rawalpindi, have shown aplastic anemia to be an important cause, diagnosed at a frequency of 20% (6/30) patients.[7]

Easy availability of over the counter medicines and also environmental factors such as increased exposure to toxic chemicals rather than genetic factors could be implicated in the etiology of aplastic anemia, as this increase is not seen in people of oriental ancestry living in US. Pakistan is an agricultural country, therefore pesticide may be an important causative factor for aplastic anemia.[4]

In a retrospective study 279 pancytopenic children of both sexes from 1month to 16 years of age were included who underwent bone marrow biopsy. Acute leukemia was the commonest finding 32.2%, followed by aplastic anemia 30.8%, megaloblastic anemia 13.2% and miscellaneous findings.[1] In another retrospective descriptive study 205 patients age between 6 months and 14 years were identified with diagnosis of pancytopenia. The most common cases were aplastic anemia 58(28.3%), hematological malignancies 49(23.9%), megaloblastic anemia 40(19.5%) and remaining of other rare etiologies.[6] Aplastic anemia is a syndrome of bone marrow failure characterized by peripheral pancytopenia and marrow hypoplasia. Mild macrocytosis is observed in association with stress erythropoiesis and elevated fetal hemoglobin levels. Paul Ehrlich introduced the concept of aplastic anemia in 1888 when he studied the case of a pregnant woman who died of bone marrow failure. However, it was not until 1904 that Anatole Chauffard named this disorder aplastic anemia.

## CONCLUSION

Pancytopenia is more common in males than females. Aplastic anemia is a common finding of pancytopenia in this part of world in the specific age group.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

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