Pathology (■ 2018) ■(■), pp. 1–9

HAEMATOLOGY

Clinico-haematological profile of patients with bicytopenia

Aneet Singh, Bhagyashri Hungund, Lalit Kumar, Mallikarjun Pattanshetti

Jawaharlal Nehru Medical College, Belgaum, India

Summary

Bicytopenia is the reduction of any of the two cell lines of blood, i.e., erythrocytes, leukocytes or platelets. Many studies are done on pancytopenia but very few studies exist in the literature evaluating the spectrum of aetiologies of bicytopenia. To date, no study is available on bicytopenia in adults.

We aimed to study the clinico-haematological profile of patients with bicytopenia and to investigate the different aetiologies of bicytopenia.

Four hundred patients with bicytopenia admitted to KLE Dr. Prabhakar Kore Charitable Hospital and Medical Research Centre were selected using systematic random sampling and included in the study. Their clinical profiles and haematological parameters were evaluated.

Bicytopenia was observed in all ages with the mean age being 30.7 years. The occurrence of bicytopenia in different age groups was 6% in neonates, 7% in infants, 25% in children, 17% in teenagers, 85% in adults and 11% in elderly. The most common bicytopenia observed was anaemia with thrombocytopenia (61%) followed by anaemia with leukopenia (26%) and leukopenia with thrombocytopenia (13%). The male to female ratio was 1.6:1. The most common aetiology of bicytopenia was found to be non-malignant (56%) followed by infectious (31.7%), malignant (8.3%) and drug-induced (4%). Megaloblastic anaemia was the predominant aetiology among the non-malignant group, closely followed by immune thrombocytopenic purpura and alcoholic liver disease. The most common infectious disease was dengue (12%). Signs like lymphadenopathy, splenomegaly and hepatomegaly were most significantly associated with haematological malignancies ($p < 0.001$). Pallor, bleeding, hepatomegaly and splenomegaly were most frequent in non-malignant conditions ($p < 0.001$). Fever and lymphadenopathy were most frequent in the infectious category ($p < 0.001$). The most prevalent signs in drug-induced aetiology were lymphadenopathy, hepatomegaly and splenomegaly ($p < 0.001$).

Bicytopenia is a good haematological indicator for many non-malignant and malignant diseases. Knowledge of its aetiologies can help in the diagnosis and efficient management of patients.

Key words: Bicytopenia; anaemia; thrombocytopenia; leukopenia; leukaemia.

Received 30 May 2017, revised 24 March, accepted 29 March 2018
Available online: xxx

INTRODUCTION

The word ‘blood’ is derived from the Old English word ‘blod’ and dates back to 1000 AD. It is defined as the vital principle.[1] However, it is also a source of many diseases. Current technology allows us to assess blood counts and other parameters to monitor the health status of an individual. Thus, any change in blood counts could be used as an indicator of certain diseases.[2]

Pancytopenia is an extensively studied subject. Many papers are published on the causes and outcomes of pancytopenia in different age groups. However, bicytopenia remains an unexplored territory. There are very few studies in the literature evaluating the spectrum of aetiologies of bicytopenia in different age groups. The awareness of these aetiologies can alert the physician to an impending disease and help to diagnose the same. Even the management is different in different cytopenias, thus highlighting the significance of studying bicytopenia.

To the best of our knowledge, no study has been undertaken on bicytopenia in this region and there is no literature on bicytopenia in adults.

The aetiology of bicytopenia varies in children, ranging from transient marrow viral suppression (0.3%) to marrow infiltration by life-threatening malignancies (69.5%). These may be caused secondary to certain drugs (12.37%), chemotherapy or radiotherapy for some malignancies.[3] Evaluating the aetiologies of bicytopenia can guide in diagnosis and efficient management of patients.[3]

The prevalence of bicytopenia in children referred for bone marrow examination, according to two studies was 40% and 45%.[3,4] The prevalence of bicytopenias in adults remains unknown. Also, there are very few studies on the aetiologies, clinical features and haematological profile of bicytopenic patients of different age groups.

Hence, there is a need to study the clinico-haematological profile of patients with bicytopenia.

MATERIALS AND METHODS

Written informed consent was taken from all the patients participating in the study. Ethical clearance was obtained from the Institutional Ethics Committee on human subjects’ research. Detailed history and clinical examination was recorded either by personal interview or from medical records using a prestructured proforma.

Peripheral smears were studied for cell morphology, to confirm the platelet counts and to look for haemoparasites like malaria. The smears were stained with Wright’s stain. Bone marrow aspiration and trephine biopsy was carried out as per the clinical indication. All the bone marrow aspirate smears were stained with Wright’s stain and trephine biopsies were stained with haematoxylin and eosin (H&E).[5–7] Special stains like myeloperoxidase, periodic

Print ISSN 0031-3025/Online ISSN 1465-3931
DOI: https://doi.org/10.1016/j.pathol.2018.03.008

Please cite this article in press as: Singh A, et al., Clinico-haematological profile of patients with bicytopenia, Pathology (2018), https://doi.org/10.1016/j.pathol.2018.03.008

acid–Schiff (PAS) and Perls' stain were performed on aspirate smears when indicated. Other relevant investigations were recorded from the medical records.

The inclusion criterion was all inpatients with bicytopenia. The exclusion criteria were all patients with pancytopenia and those with isolated cytopenia. Bicytopenia was defined as decrease in the counts, i.e., less than normal for that age and sex, of any two cell lineages with either of the following combination, anaemia with thrombocytopenia, anaemia with leukopenia, and leukopenia with thrombocytopenia. Blood counts and peripheral smears were reviewed to study the prevalence of bicytopenia and to find the most common combination of cytopenia.

To investigate age distribution, the study subjects were divided into five groups of age: <1 year (infants), 1–12 years (children), 13–18 years (teenagers), 19–59 years (adults) and >60 years (elderly).

The aetiologies were divided into four broad categories: malignant, non-malignant, infectious and drug-induced. Malignant category was defined as all haematological malignancies presenting with bicytopenia. Non-malignant included all the non-malignant conditions except those due to active infections or drug-induced aetiologies. Infectious category comprised of all the cases with active infection confirmed by serological tests. Drug-induced category included all the cases who presented with bicytopenia post-therapy. Fever, bleeding, hepatomegaly, splenomegaly, lymphadenopathy and pallor were the five clinical findings evaluated.

Statistical analysis

The clinico-haematological profiles of bicytopenic patients were described using descriptive statistics (mean, standard deviation and percentage). Chi-square test was used to compare the categorical variables. Probability (p) values <0.05 were considered significant for the association between different variables and bicytopenia. SPSS (IBM, USA) and Excel (Microsoft, USA) were used to evaluate the data.

RESULTS

The data obtained were tabulated and analysed. Bicytopenia was observed and studied among five age groups: <1 year of age (infants) (8%), 1–12 years (children) (17.25%), 13–18 years (teenagers) (8%), 19–59 years (adults) (55.5%) and >60 years (elderly) (11.25%). The mean age was 30.7 years with the range being 1 day to 90 years. Standard deviation (SD) of age was 21.4 years.

Sex distribution revealed that males accounted for 61.25% of the cases and females accounted for 38.75% of the cases. The male to female ratio was 1.6:1. Throughout all ages it was observed that a higher number of males presented with bicytopenia than females (Fig. 1).

Anaemia with thrombocytopenia (244 cases, 61%) was found to be the most common bicytopenia (Table 1) followed by anaemia with leukopenia (104 cases, 26%). Leukopenia with thrombocytopenia (52 cases, 13%) was least common.

The most common aetiology of bicytopenia was found to be non-malignant (224 cases, 56%) followed by infectious (127 cases, 31.7%), malignant (33 cases, 8.3%) and drug-induced (16 cases, 4%) (Table 2). Table 3 shows details of diseases for each aetiology.

Anaemia with thrombocytopenia (62.1%) was the most significant bicytopenia observed in non-malignant aetiology. Leukopenia with thrombocytopenia and anaemia with leukopenia (52%) were equally significant in infectious aetiology. Anaemia with thrombocytopenia (56.2%) was the predominant bicytopenia in drug-induced aetiology, closely followed by anaemia with leukopenia (37.5%) (Table 4).

The most common aetiology of bicytopenia observed in neonates and infants was non-malignant (85%). No malignancy or drug-induced bicytopenias were seen in this age group. In the age group 1–12 years, the most common aetiology observed was infectious (47.8%), closely followed by non-malignant (42%). In the age group 13–18 years, the most common aetiology was non-malignant (40.6%) followed by infectious (34.4%). In the age group 19–59 years, the most common aetiology was non-malignant (58.6%), followed by infectious (30.6%), malignant (14%) and drug-induced (4.5%). In the elderly age group, the most common aetiology was non-malignant (53.3%), followed by infectious (22.2%), malignant (20%) and drug-induced (4.4%). A statistically significant correlation was found between the age groups and the aetiology ($p < 0.001$) (Table 5).

The most common symptom at the time of presentation was fever (53.5%), followed by pallor (42.5%), bleeding/

Table 1 Bicytopenia frequency

Peripheral smear	No. cases	%
Anaemia with thrombocytopenia	244	61
Anaemia with leukopenia	104	26
Leukopenia with thrombocytopenia	52	13

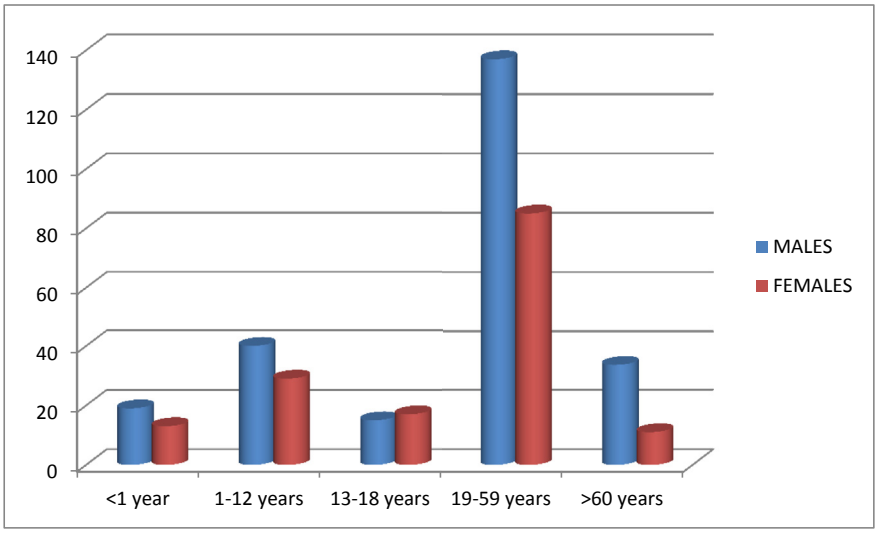

Fig. 1 Age-wise sex distribution in bicytopenia.

Please cite this article in press as: Singh A, et al., Clinico-haematological profile of patients with bicytopenia, Pathology (2018), https://doi.org/10.1016/j.pathol.2018.03.008