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ADULT NEUTROPENIA : A STUDY OF CLINICAL FEATURES AND HEMATOLOGICAL PARAMETERS IN A TERTIARY CARE CENTRE

Hemato-Pathology

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ABSTRACT

Background: Neutropenia is a significant hematological abnormality characterized by a reduction in the absolute neutrophil count (ANC) in peripheral blood. Since neutrophils are essential components of innate immunity, their reduction predisposes individuals to infections and other complications. The etiology of neutropenia ranges from benign transient conditions such as viral infections to serious hematological disorders including bone marrow failure and malignancies. Understanding the clinical and hematological profile of neutropenia is essential for early diagnosis and appropriate management. **Aim:** To analyze the clinicohematological profile of neutropenia in adults attending a tertiary care centre. **Materials and Methods:** This analytical prospective study was conducted in the Department of Pathology, Osmania General Hospital, Hyderabad over a period of 18 months. A total of 240 adult patients with neutropenia (ANC <1.8 × 10⁹/L) were included in the study. Demographic data, clinical features, hematological parameters, and etiological factors were recorded. Complete blood counts were performed using automated hematology analyzers and peripheral smear examination was done using Leishman staining. Bone marrow examination was performed in selected cases. Data were analyzed using SPSS software. **Results:** Among 240 patients, the majority belonged to the 30–45 years age group (31.7%). Males constituted 54.2% while females accounted for 45.8%. Fever was the most common presenting symptom. Mild neutropenia was the most frequently observed category, followed by moderate and severe neutropenia. Infectious causes were the most common etiological factors, followed by nutritional deficiencies and drug-induced causes. **Conclusion:** Neutropenia in adults is a multifactorial condition with diverse etiologies. Clinicohematological evaluation plays a crucial role in identifying the underlying cause and guiding management. Early diagnosis and appropriate treatment can significantly reduce morbidity associated with neutropenia.

KEYWORDS

Neutropenia, Absolute Neutrophil Count, Hematology, Infection, Bone Marrow

INTRODUCTION

Neutropenia is defined as a reduction in the absolute neutrophil count (ANC) in peripheral blood below normal levels. Neutrophils constitute the major population of circulating leukocytes and are essential for the body's defense against bacterial and fungal infections(1,3).

In adults, neutropenia is generally defined as an ANC less than 1500 cells/μL and is classified into mild (1000–1500/μL), moderate (500–1000/μL), and severe (<500/μL) categories(3,4).

The severity and duration of neutropenia significantly influence the risk of infection (2).

Patients with severe neutropenia are particularly susceptible to opportunistic infections and septic complications. The condition may arise due to decreased production of neutrophils in the bone marrow, increased peripheral destruction, or abnormal distribution of neutrophils(1,3,6).

Various etiological factors contribute to neutropenia, including infections, nutritional deficiencies, autoimmune disorders, drug-induced bone marrow suppression, and hematological malignancies(3,4,7).

In clinical practice, neutropenia may present as an incidental laboratory finding or with symptoms such as fever, recurrent infections, oral ulcers, and sepsis.

A systematic clinicohematological evaluation is essential to determine the underlying cause of neutropenia. Laboratory investigations including complete blood count, peripheral smear examination, and bone marrow studies play a key role in diagnosis(3,8).

Tertiary care hospitals manage a wide spectrum of patients with complex medical conditions. Therefore, studying the clinical and hematological patterns of neutropenia in such settings provides valuable insights into its epidemiology and underlying causes. This study was undertaken to analyze the clinicohematological profile of neutropenia in adults attending a tertiary care centre in Hyderabad.

MATERIALS AND METHODS

This analytical prospective study was conducted in the Department of Pathology at Osmania General Hospital, Hyderabad over a period of 2 years.

Study Population

A total of 240 adult patients diagnosed with neutropenia were included in the study. Patients were enrolled consecutively after obtaining informed consent.

Inclusion Criteria

Patients aged between 15 and 75 years
Absolute neutrophil count less than 1.8 × 10⁹/L
Patients who provided informed consent

Exclusion Criteria

Patients outside the age group of 15–75 years
Patients with incomplete clinical records

Data Collection

Detailed clinical history and demographic information were recorded. Clinical features including fever, recurrent infections, oral ulcers, fatigue, weight loss, and bleeding manifestations were documented.

Peripheral venous blood samples were collected under aseptic conditions in EDTA vacutainers. Complete blood counts were performed using automated hematology analyzers.

The absolute neutrophil count (ANC) was calculated using the formula:

ANC = Total WBC count × (% Neutrophils + % Bands) / 100

Peripheral blood smears were prepared and stained using Leishman stain. Microscopic examination was performed to assess neutrophil morphology, presence of toxic granulation, hypersegmented neutrophils, blast cells, and other abnormalities.

Bone marrow aspiration and biopsy were performed in selected cases with persistent or unexplained neutropenia.

Study Parameters
The following parameters were evaluated:
Age and gender distribution
Clinical presentation
Hematological parameters
Severity of neutropenia
Etiological factors

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using SPSS software. Descriptive statistics such as mean, frequency, and percentage were used to summarize the data. Results were presented in tables and graphs.

RESULTS

Age Distribution
Among the 240 patients included in the study, the majority belonged to the 30–45 years age group (31.7%). Patients aged 45–60 years accounted for 27.9%, while those below 30 years constituted 20.4%. Individuals above 60 years represented 20% of the study population.

Gender Distribution
Out of 240 participants, 130 (54.2%) were males and 110 (45.8%) were females, showing a slight male predominance.

Clinical Presentation
Fever was the most common presenting symptom among patients with neutropenia. Other clinical manifestations included recurrent infections, oral ulcers, fatigue, and weight loss.

Severity of Neutropenia
Based on ANC values, patients were categorized into three groups:
Mild neutropenia (1000–1500/µL)
Moderate neutropenia (500–1000/µL)
Severe neutropenia (<500/µL)
Mild neutropenia was the most common category observed in the study.

Etiological Factors
The etiological distribution revealed that infectious causes were the most common factors associated with neutropenia. Nutritional deficiencies such as vitamin B12 and folate deficiency were also frequently observed. Drug-induced neutropenia and bone marrow disorders accounted for a smaller proportion of cases.

DISCUSSION

Neutropenia is a clinically significant hematological condition that predisposes individuals to infections due to impaired immune function(1,2).

In the present study, neutropenia was most frequently observed in the 30–45 years age group. This finding may be attributed to increased exposure to infections, medications, and other environmental factors in this age group.

A slight male predominance was observed in the study population. Similar findings have been reported in previous studies, suggesting that gender differences may influence susceptibility to certain etiological factors.

Fever was the most common presenting symptom among patients with neutropenia. This is consistent with the pathophysiological role of neutrophils in host defense(9,10,11).

In neutropenic individuals, infections may present with minimal inflammatory signs due to impaired immune response.

Mild neutropenia was the most frequently observed category in the present study. Many patients with mild neutropenia remain asymptomatic and are often diagnosed incidentally during routine blood investigations(3,4).Infectious diseases were identified as the most common cause of neutropenia. Viral infections are known to cause transient bone marrow suppression, leading to reduced neutrophil production(1,3).

Nutritional deficiencies, particularly vitamin B12 and folate deficiency, were also important causes in this study(6,7).

Drug-induced neutropenia was observed in patients receiving antibiotics, anticonvulsants, and other medications known to suppress bone marrow function. Early identification and withdrawal of the offending drug are essential for recovery(3,4).

Bone marrow disorders such as leukemia and aplastic anemia were less common but represent serious causes of neutropenia requiring prompt diagnosis and treatment(6,7).

Clinicohematological correlation plays a vital role in identifying the underlying etiology of neutropenia. Peripheral smear examination and bone marrow studies provide valuable diagnostic information(3,8).

Early recognition of neutropenia and appropriate management are essential to prevent complications such as severe infections and sepsis.

CONCLUSION

Neutropenia is a multifactorial hematological condition with diverse etiologies ranging from transient infections to serious bone marrow disorders. In this study, mild neutropenia was the most common category, and infectious causes were the predominant etiological factors.

Clinicohematological evaluation including complete blood count, peripheral smear examination, and bone marrow analysis is essential for accurate diagnosis. Early detection of underlying causes and timely management can significantly reduce morbidity associated with neutropenia.

Further studies with larger sample sizes are required to better understand the epidemiology and clinical implications of neutropenia in different populations.

REFERENCES

1. Boxer LA. How to approach neutropenia. Hematology Am Soc Hematol Educ Program. 2012;2012:174-182.
2. Bodey GP, Buckley M, Sathe YS, Freireich EJ. Quantitative relationships between circulating leukocytes and infection in patients with acute leukemia. Ann Intern Med. 1966;64(2):328-340.
3. Newburger PE, Dale DC. Evaluation and management of patients with isolated neutropenia. Semin Hematol. 2013;50(3):198-206.
4. Palmblad J, Dufour C, Papadaki HA. How we diagnose neutropenia in the adult and elderly patient. Haematologica. 2014;99(7):1130-1133.
5. Berliner N. Approach to the adult with unexplained neutropenia. UpToDate. 2020.
6. Lichtman MA, Kaushansky K, Prchal JT, Levi MM, Press OW, Burns LJ, Caligiuri M. Williams Hematology. 9th ed. New York: McGraw Hill; 2016.
7. Hoffbrand AV, Moss PAH. Essential Haematology. 7th ed. Oxford: Wiley-Blackwell; 2016.
8. Bain BJ. Blood Cells: A Practical Guide. 5th ed. Oxford: Wiley-Blackwell; 2015.
9. Mandal PK, Dolai TK, Ghosh P, et al. Microbial profile of febrile neutropenia in patients with hematological malignancies. Indian J Hematol Blood Transfus. 2014;30(4):274-278.
10. Ghosh S, Narayanasamy K, et al. Bacteremia in febrile neutropenic patients in a tertiary care centre. Indian J Cancer. 2012;49(3):300-305.
11. Jacob LA, Lakshmaiah KC, et al. Epidemiology of febrile neutropenia in adult cancer patients. South Asian J Cancer. 2014;3(4):234-237.
12. Patil VM, Noronha V, Joshi A, et al. Febrile neutropenia in solid tumors: Experience from a rural cancer center. South Asian J Cancer. 2014;3(3):168-171.
13. Babu KG, Lokanatha D, et al. Blood stream infections in febrile neutropenic patients: A single center experience. Indian J Med Paediatr Oncol. 2016;37(4):220-224.
14. Mishra S, et al. Febrile neutropenia in acute myeloid leukemia patients: Clinical profile and outcomes. Asian Pac J Cancer Care. 2021;6(3):145-150.
15. Meena JP, et al. Clinical profile and outcomes of febrile neutropenia in children with cancer. Indian Pediatr. 2020;57(4):324-329.
16. Nimmagadda SR, et al. Acute neutropenia in adults presenting with fever in tertiary care hospital. J Clin Diagn Res. 2023;17(5):EC10-EC14.
17. Osmani AH, et al. Clinical outcomes of febrile neutropenia in adult cancer patients treated with G-CSF. J Oncol Pharm Pract. 2017;23(2):123-129.
18. Raghavan V, et al. Knowledge and practices of nurses regarding febrile neutropenia management. Asian Pac J Oncol Nurs. 2025.
19. Feghali J, et al. Adherence to antimicrobial guidelines in febrile neutropenia patients. Infect Drug Resist. 2025.