

Original Research

Assessment of clinical profile of neutropenia in children

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ABSTRACT:

Background: Neutrophils or polymorphonuclear leukocytes develop from the stem cells in the blood marrow. The present study was conducted to assess clinical profile of neutropenia in children. **Materials & Methods:** 64 patients with neutropenia (ANC less than 1500/mm³), in the age group 1 months to 18 years of both genders were included. Parameters such as the length of stay at hospital was recorded. **Results:** Out of 64 patients, males were 38 and females were 26. The mean ANC at admission in dengue was 1720 and at discharge was 1940, in malaria was 2062 at admission and 2210 at discharge, in enteric fever was 2214 at admission and 1642 at discharge. Severity was mild in 24, moderate in 28 and severe in 12. Duration of neutropenia was 2.4 days, 5.1 days and 8.3 days and hospital stays was 7.42 days, 8.12 days and 12.06 days respectively. The difference was significant ($P < 0.05$). **Conclusion:** Dengue fever and other acute viral illnesses were the most common cause of neutropenia in children.

Key words: Acute viral illnesses, Dengue fever, neutropenia

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INTRODUCTION

Neutrophils or polymorphonuclear leukocytes develop from the stem cells in the blood marrow.¹ These cells are involved in acute inflammation and host defence against bacterial infections and phagocytosis occurs in these cells. $1-1.5 \times 10^9$ /kg neutrophils are produced daily in the human body and they are found in the storage pool in the bone marrow. Only 2-5% enter the circulation. A portion of these cells are located on the vascular wall.²

The average lifespan of neutrophils is 7-10 days. Maturation stages in the bone marrow are as follows: stem cell, myeloblast, promyelocyte, myelocyte, metamyelocyte, band and neutrophil. The cells do not divide after the stage of myelocyte. Generally, half of the cells in the bone marrow are composed of white blood cells.³ The majority of these cells include metamyelocytes and the following mature cells. The band cells and neutrophils in the bone marrow constitute 50% of the granulocyte series. Mature neutrophils are transferred to the tissues after staying in the circulation for 3-12 hours and live there for 2-3 days.⁴

The clinical presentation usually depends on the etiology. Fever, gingivitis, stomatitis, periodontitis, splenomegaly, cervical lymphadenopathy, skin and perirectal abscess and growth retardation are common observations in children. The severity, duration and outcome of neutropenia are variable depending on the etiology.⁵ Neutropenia is commonly seen in acute febrile conditions like dengue, malaria and typhoid. The fall of neutrophil count happens after 24 hours of apyrexia.⁶ The present study was conducted to assess clinical profile of neutropenia in children.

MATERIALS & METHODS

The present study comprised of 64 patients with neutropenia (ANC less than 1500/mm³), in the age group 1 months to 18 years of both genders. The consent for the study was obtained from parents. Data such as name, age, gender etc. was recorded. Parameters such as the length of stay at hospital, association with thrombocytopenia, development of complications and final management outcome was recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 64		
Gender	Males	Females
Number	38	26

Table I shows that out of 64 patients, males were 38 and females were 26.

Table II ANC and diseases

Disease	ANC at admission	ANC at discharge
Dengue	1720	1940
Malaria	2062	2210
Enteric fever	2214	1642

Table II, graph I shows that mean ANC at admission in dengue was 1720 and at discharge was 1940, in malaria was 2062 at admission and 2210 at discharge, in enteric fever was 2214 at admission and 1642 at discharge.

Graph I ANC and diseases

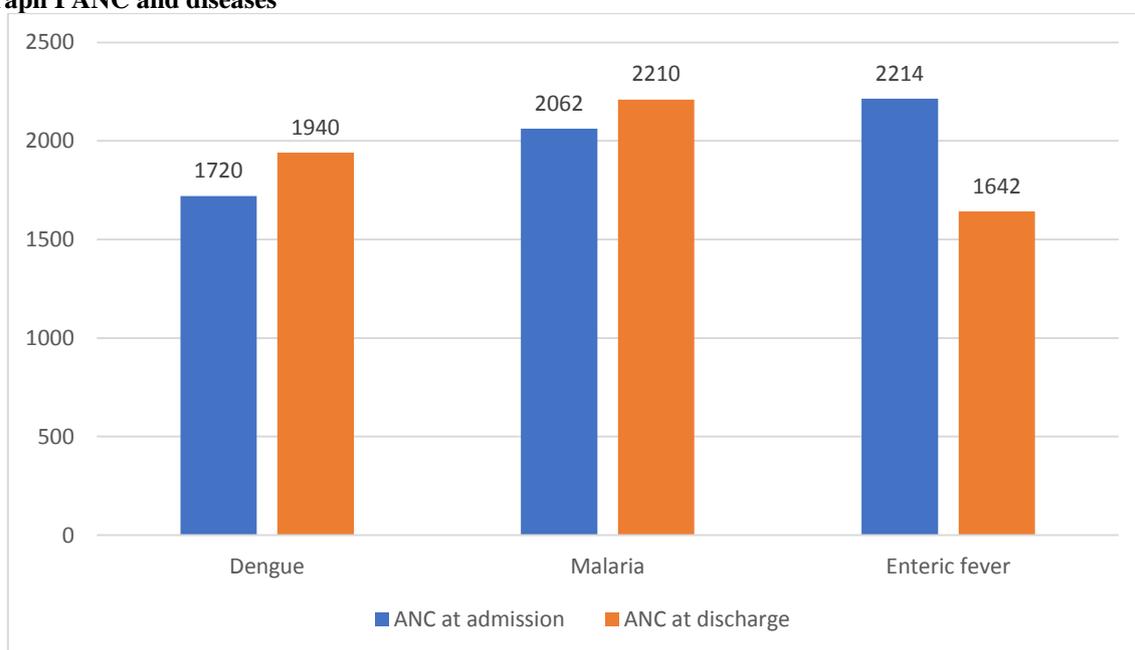
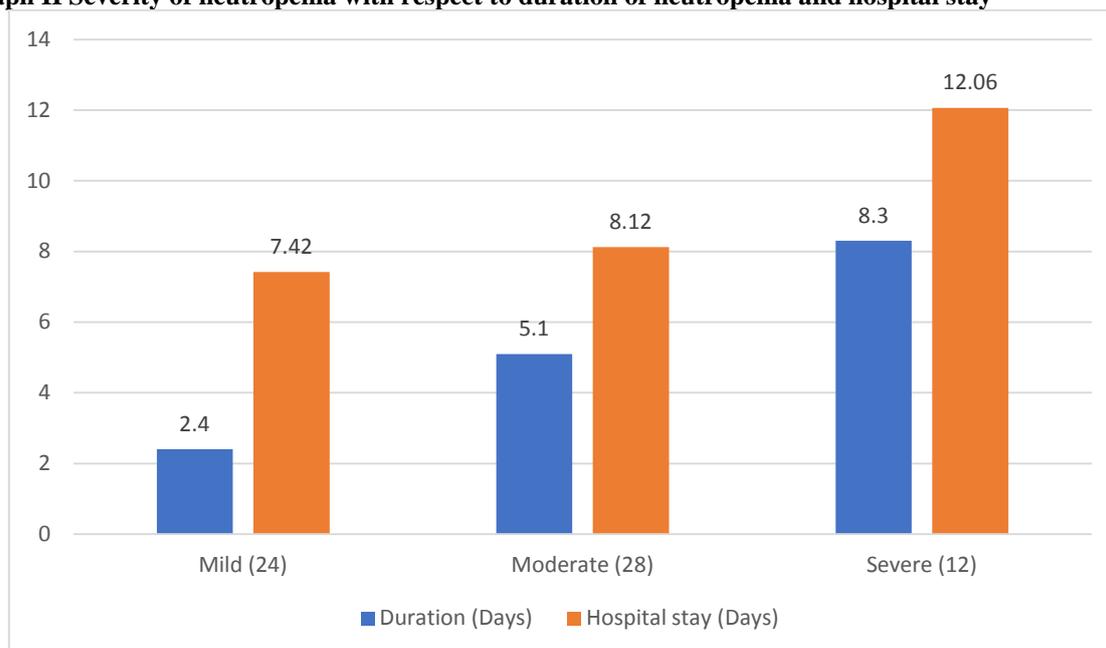


Table III Severity of neutropenia with respect to duration of neutropenia and hospital stay

Severity	Duration (Days)	Hospital stay (Days)	P value
Mild (24)	2.4	7.42	0.01
Moderate (28)	5.1	8.12	
Severe (12)	8.3	12.06	

Table III, graph II shows that severity was mild in 24, moderate in 28 and severe in 12. Duration of neutropenia was 2.4 days, 5.1 days and 8.3 days and hospital stays was 7.42 days, 8.12 days and 12.06 days respectively. The difference was significant (P< 0.05).

Graph II Severity of neutropenia with respect to duration of neutropenia and hospital stay

DISCUSSION

An absolute neutrophil count (ANC) below the normal level by age and race is defined as neutropenia. The lower limit of neutropenia in newborns is $6\ 000/\text{mm}^3$. As the baby grows up, this limit reduces to $1\ 000/\text{mm}^3$ by the second week and this level is accepted to be normal up to the age of one year. After the age of one year the lower limit is $1500/\text{mm}^3$. In the black race, this limit is accepted to be $1200/\text{mm}^3$.⁷

Neutropenia may also be classified as acute or chronic and acquired or congenital. If a finding persists longer than 14 days, it is generally considered to have become chronic in medicine.⁸ For neutropenia this period is stated to be two months in some books and six months in some others. It has been stated that correction of neutropenia even following a simple event may last for up to 8–12 months. Therefore, it is thought that calling neutropenia “chronic” before 6 months is not very appropriate. There are two more neutropenia types with unclear etiology which are difficult to classify as acquired or congenital and which are observed in the childhood: chronic benign neutropenia and familial neutropenia.⁹ The present study was conducted to assess clinical profile of neutropenia in children.

In present study, out of 64 patients, males were 38 and females were 26. The mean ANC at admission in dengue was 1720 and at discharge was 1940, in malaria was 2062 at admission and 2210 at discharge, in enteric fever was 2214 at admission and 1642 at discharge. Mahajan et al¹⁰ in their study duration of neutropenia and secondary outcomes of hospital stay duration, association with thrombocytopenia, incidence of complications and finally discharge/death were analyzed. Acute transient neutropenia was seen, the median duration being 3 d in younger patients.

Dengue fever was the commonest etiology. The median duration of hospital stay was 8 d. Fifty-three (68.8%) patients had associated thrombocytopenia. Three children developed complications like nosocomial sepsis and shock. Seventy-two (93.5%) were discharged, 1 died, 3 left against medical advice and one patient was followed up for 4 weeks.

We found that severity was mild in 24, moderate in 28 and severe in 12. Duration of neutropenia was 2.4 days, 5.1 days and 8.3 days and hospital stays was 7.42 days, 8.12 days and 12.06 days respectively. The Kuwait study reported infections in 55% of children. Karavanaki et al¹¹ showed that infections were seen in 50.7% of neutropenic patients and 35.4% children had persistent findings. Thein et al¹² however had suggested that there is no risk of superimposed bacterial disease or complications in severe neutropenia. In case of high suspicion of enteric fever, antibiotics may be initiated; this differs in neutropenic children with cancer, where empirical antibiotics should be initiated at the onset of fever.

In evaluation of the patients, neutropenia should be confirmed primarily. When a neutropenic blood count is found, blood count is repeated on the blood sample which is ensured to have been obtained under appropriate conditions and not kept waiting, using a qualified automation device. Examination should be performed after neutropenia is confirmed with peripheral smear. In addition, findings directed to specific diagnoses should be evaluated with peripheral smear.¹³ For example, presence of blasts suggests leukemia, nucleated erythrocytes suggest hemolytic anemia or blood loss, hypersegmented neutrophils suggest vitamin B₁₂ or folic acid deficiency and neutrophils with pycnotic nuclei suggest myelokathexis.

CONCLUSION

Authors found that dengue fever and other acute viral illnesses were the most common cause of neutropenia in children.

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