
**P-ISSN:** 2664-3685
**E-ISSN:** 2664-3693
IJPG 2021; 4(1): 22-24
Received: 19-12-2020
Accepted: 21-01-2021

**Dr. Bopanna KM**
Associate Professor,
Department of Paediatrics,
Akash Institute of Medical Sciences Devanahalli,
Bangalore, Karnataka, India

**Corresponding Author:**
**Dr. Bopanna KM**
Associate Professor,
Department of Paediatrics,
Akash Institute of Medical Sciences Devanahalli,
Bangalore, Karnataka, India

# Determination of cases of neutropenia in 104 children

## Dr. Bopanna KM

**DOI:** https://doi.org/10.33545/26643685.2021.v4.i1a.122

**Abstract**
**Background:** Neutropenia, usually defined as an absolute neutrophil count below 1.5 × $10^9$/L, encompasses a wide range of diagnoses, from normal variants to life-threatening acquired and congenital disorders. The present study evaluated cases of neutropenia and fever in children.
**Materials & Methods:** 104 children confirmed case of fever and neutropenia of both genders Were studied.
**Results:** Age group 10-12 years had 14 boys and 8 girls, 12-14 years had 20 boys and 10 girls and 14-16 years had 30 boys and 12 girls. The main cause of neutropenia was bacterial in 54, viral in 20, fungal in 15, drugs in10 and autoimmune in 5 cases. The difference was significant ($P$<0.05). Out of 104 patients, 98 survived and 6 died. The difference was significant ($P$<0.05).
**Conclusion:** Authors found that maximum cases were seen in boys and age group 14-16 years.

**Keywords:** children, fever, neutropenia

## Introduction
Neutropenia, usually defined as an absolute neutrophil count (ANC) below 1.5 × $10^9$/L (1500/$mm^3$), encompasses a wide range of diagnoses, from normal variants to life-threatening acquired and congenital disorders [1]. The functional consequences depend largely, but not exclusively, on the severity of neutropenia: ANC of 1.0–1.5 × $10^9$/L does not impair host defense, but may warrant investigation of the underlying cause; ANC of 0.5–1.0 × $10^9$/L may slightly increase the risk of infections, but only if other arms of the immune system are impaired; ANC of 0.2–0.5 × $10^9$/L is associated with an increased risk of infections in most patients. ANC of 0.2 × $10^9$/L or less (often referred to as "agranulocytosis") carries a risk of severe, life-threatening infections with susceptibility to opportunistic organisms [2].
Despite a considerable reduction over the past decades in infection-related mortality in patients with cancers who present with fever and neutropenia (FN), infections remain a major cause of morbidity and mortality in this susceptible population. The strategy of using empiric antibiotics has greatly influenced the outcome of fever in a neutropenic host [3].
It is important to note that blood neutrophil counts are not as stable as other blood cell counts or many other physiological measurements. Counts may vary considerably over short periods of time, associated with activity, exercise, eating or just the time of day. Counts vary even more with serious infections, inflammatory disorders, corticosteroid therapy or extreme anxiety [4]. It is always important in the evaluation of blood neutrophil counts to consider the conditions when the blood sample was obtained and to have several measurements when defining the severity of acute or chronic neutropenia. Neutropenia can be described as transient (or "acute") or chronic (or "persistent"); extrinsic or intrinsic; by descriptive names (e.g., neonatal isoimmune neutropenia of infancy, cyclic neutropenia, severe congenital neutropenia) and as syndromes (e.g., Kostmann, Shwachman-Diamond, and Barth syndromes). The discovery of the diverse causes for the congenital neutropenias now permits genetic diagnosis in many cases [5]. The present study evaluated cases of neutropenia and fever in children.

## Materials & Methods
The present study comprised of 104 children confirmed case of fever and neutropenia of both genders. Fever was defined as a single oral temperature of ≥ 38.3 °C or an oral temperature of ≥ 38.0 °C that persists for over one hour. Neutropenia was defined as an ANC ≤ 500 cells/mm3. All were included in the study after obtaining their written consent.

Data such as name, age, gender etc. was recorded. A thorough clinical examination was performed. Duration of fever, days of hospitalization and mortality rate was recorded. Results of the study was compiled and entered in MS sheet for statistical analysis. Chi- square test and Mann Whitney U test was used for analysis. P value less than 0.05 was considered significant.

## Results

**Table 1:** Distribution of patients

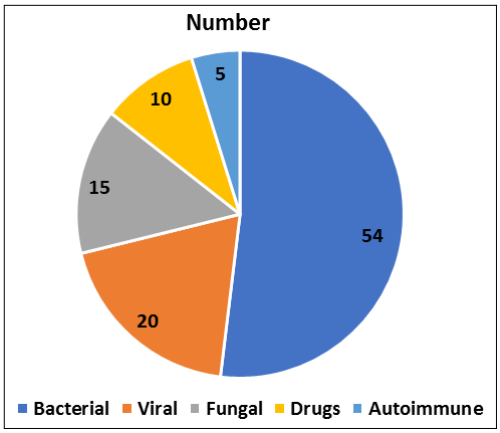
| Age group (Years) | Boys | Girls |
|---|---|---|
| 10-12 | 14 | 8 |
| 12-14 | 20 | 10 |
| 14-16 | 30 | 12 |

Table I shows that age group 10-12 years had 14 boys and 8 girls, 12-14 years had 20 boys and 10 girls and 14-16 years had 30 boys and 12 girls.

**Table 2:** Causes of neutropenia in children

| Causes | Number | P value |
|---|---|---|
| Bacterial | 54 | 0.01 |
| Viral | 20 | |
| Fungal | 15 | |
| Drugs | 10 | |
| Autoimmune | 5 | |

Table II, graph I shows that main cause of neutropenia was bacterial in 54, viral in 20, fungal in 15, drugs in10 and autoimmune in 5 cases. The difference was significant ($P$< 0.05).




**Graph 1:** Causes of neutropenia in children

**Table 3:** Outcome of cases

| Outcome | Number | P value |
|---|---|---|
| Live | 98 | 0.02 |
| Death | 6 | |

Table III shows that out of 104 patients, 98 survived and 6 died. The difference was significant ($P$< 0.05).

## Discussion

The differential diagnosis for a fever of unknown origin is expansive, but it can be classified into 4 major categories related to underlying etiology: 1) infection; 2) autoimmune/ connective tissue disease; 3) malignancy; and 4) allergic/reactive. Other and less common etiologies including granulomatous and congenital diseases can also be considered [6]. Infections represent the most common causes of fever, although the likelihood of a specific agent varies across geographic location, exposure history, and inherent patient characteristics including age, gender, and race. Autoimmune and connective tissue diseases such as systemic lupus erythematous and vasculitis are also commonly encountered causes of fever. Among the malignancies, lymphoma, in particular non-Hodgkin lymphoma [7]. The present study evaluated cases of neutropenia and fever in children.

In present study, age group 10-12 years had 14 boys and 8 girls, 12-14 years had 20 boys and 10 girls and 14-16 years had 30 boys and 12 girls. Dubey *et al.* [8] in their study out of 56 patients, males were 30 and females were 26. Etiology of fever was bacteremia in 25, viral URI in 13, GI infection in 4, pneumonia in 7, fungal infection in 4 and others in 3. The difference was significant ($P$<0.05). The mean duration of fever in males was 1.5 days and in females was 1.8 days, duration of hospitalization in males was 4.2 days and in females was 3.7 days, mortality within 2 weeks in males was 5 and in females was 2. The difference was significant ($P$< 0.05).

We observed that main cause of neutropenia was bacterial in 54, viral in 20, fungal in 15, drugs in10 and autoimmune in 5 cases. Out of 104 patients, 98 survived and 6 died. Ren *et al.* [9] reported a case in a 22-year-old African-American male with chief complaint of episodic fever. Patient has experienced episodic fevers regularly for the past 6 months. Initially, the fevers occurred 4-6 weeks apart but have been increasing in frequency in the past 2 months. Each episode reportedly lasts about 3 days, with the fever peaking around 103°F. The fever is accompanied by muscle pain and occasionally sore throat, chills, and night sweats. There is no associated nausea, vomiting, or lymphadenopathy. During the previous 3 weeks, the patient reported a decreased appetite and an unintended weight loss of 10-20 pounds. The fevers typically resolved with acetaminophen, and the patient recently completed several courses of amoxicillin.

Chronic autoimmune neutropenia of infancy and early childhood is a relatively common disorder and virtually always runs a benign course, despite very low ANCs. It usually resolves spontaneously by age 3–5 years, with a mean duration of 17 months. In most cases, neutropenia is detected during the occurrence of an acute febrile illness [10]. With follow-up, the neutropenia persists after resolution of the illness that led to testing. Systematic studies indicate that many, but not all, of these children have autoantibodies directed against surface antigens of neutrophils. From a clinical perspective the value of testing for autoantibodies in patients with moderate to severe neutropenia without evidence of recurrent fevers or infections is debatable [11]. Testing is not widely available and, if done, it is best performed by a reference laboratory performing these assays frequently. Serial testing may give inconsistent results and patients with genetic as well as acquired neutropenia may have false positive test results [12].

Griffin *et al.* [13] found that out of337 FN episodes, infection was proven in 86 (25%) and probable in 75 (22%). 177 episodes (53%) were judged fever of unknown origin (FUO). Bacteremia accounted for most (41) of the proven bacterial episodes, with viridans streptococci (13), Pseudomonas spp (6) and E. coli (6) the most frequently

isolated organisms. The median time to positivity of blood cultures was 12 hrs (range 5.4 - 143.7) with 93% positive within 24 hours of incubation. Viral pathogens were identified in 29 (34%) episodes. Compared to other patients, those with FUO had shorter median duration of fever.

In older children, chronic autoimmune neutropenia or multiple immune cytopenias should raise suspicion of a congenital immunological disorder such as autoimmune lymphoproliferative syndrome or common variable immunodeficiency [14]. Screening for these disorders can be performed by measurement of circulating T cell receptor alpha/beta positive, CD4/CD8 double negative T cells or of serum immunoglobulins, respectively. Definitive diagnosis of these conditions requires specialized immunological testing [15].

## Conclusion

Authors found that maximum cases were seen in boys and age group 14-16 years.

## References


1. Wright DG, Dale DC, Fauci AS *et al*. Human cyclic neutropenia: Clinical review and long-term follow-up of patients. Medicine (Baltimore) 1981;60:1-13.
2. Haurie C, Dale DC, Mackey MC. Cyclical neutropenia and other periodic hematological disorders: A review of mechanisms and mathematical models. Blood 1998;92:2629-2640.
3. Dale DC, Hammond WP 4th. Cyclic neutropenia: A clinical review. Blood Rev 1988;2:178-185.
4. Lange RD, Jones JB. Cyclic neutropenia. Review of clinical manifestations and management. Am J Pediatr Hematol Oncol 1981;3:363-367.
5. Dale DC. Immune and idiopathic neutropenia. Curr Opin Hematol 1998;5:33-36.
6. Palmer SE, Stephens K, Dale DC. Genetics, phenotype, and natural history of autosomal dominant cyclic hematopoiesis. Am J Med Genet 1996;66:413-422.
7. Loughran TP, Jr., Clark EA, Price TH *et al*. Adult-onset cyclic neutropenia is associated with increased large granular lymphocytes. Blood 1986;68:1082-1087.
8. Dubey AK, Singh D. Assessment of Etiology and Outcome of Fever and Neutropenia in Children. J Adv Med Dent Scie Res 2019;7(5):211-214.
9. Ren R, Willis MS, Fedoriw Y. Episodic Fever and Neutropenia in a 22-Year-Old Male. Laboratory Medicine 2010;41(12):708-12.
10. Yadegarynia D, Tarrand J, Raad I, Rolston K. Current spectrum of bacterial infections in patients with cancer. Clin Infect Dis 2003;37(8):1144-1145.
11. Koll BS, Brown AE. The changing epidemiology of infections at cancer hospitals. Clin Infect Dis 1993;17(Suppl2):S322-328.
12. Gaur AH, Giannini MA, Flynn PM *et al*. Optimizing blood culture practices in pediatric immunocompromized patients: evaluation of media types and blood culture volume. Pediatr Infect Dis J 2003;22(6):545-552.
13. Griffin H, Navaratnam P, Lin HP. Surveillance study of bacteraemic episodes in febrile neutropenic children. Int J Clin Pract 2002;56(4):237-240.
14. Ascioglu S, Rex JH, de Pauw B *et al*. Defining opportunistic invasive fungal infections in immunocompromized patients with cancer and hematopoietic stem cell transplants: an international consensus. Clin Infect Dis 2002;34(1):7-14.
15. Santolaya ME, Alvarez AM, Becker A *et al*. Prospective, multicenter evaluation of risk factors associated with invasive bacterial infection in children with cancer, neutropenia, and fever. J Clin Oncol 2001;19(14):3415-3421.