
Brief Reports

Bacterial Infections in Leukemias

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Despite recent advances in chemotherapy and supportive care, mortality and morbidity in childhood leukemias are remaining the same in developing countries. Our hospital statistics revealed that the major cause of death in childhood leukemias is infection. The present study was, therefore, undertaken to assess the morbidity and mortality pattern secondary to bacterial infections in leukemia patients.

Material and Methods

All the leukemia cases (old and new) admitted between January 1993 to February 1994 constituted the study material. Important investigations done were hemogram, peripheral smear, bone marrow and appropriate cultures on suspicion of infection. Specimens sent were blood, urine, pus, CSF, swabs and aspi-

rates. All patients were given prophylactic co-trimoxazole during induction. Antibiotics were changed depending on culture and sensitivity reports. Anaerobic, fungal and viral cultures were not done due to lack of laboratory facilities. The patients were treated in the general ward since isolation was not possible in our set up.

Results

Of the 33 cases of leukemias, 26 (78.7%) were acute lymphocytic leukemia (ALL) and 7 (21.3%) acute nonlymphocytic leukemia (ANLL). Twenty seven were newly diagnosed cases and the remaining 6 were readmissions. Acute leukemias were common between 2 and 10 years (24 cases). Twenty nine cases (88%) had infections, of which 23 (86%) acquired infection in the hospital during treatment. Six patients were brought for the treatment of infection while on maintenance therapy. Most of these children had multiple infectious episodes with same or different organisms. In all the patients, absolute granulocyte count was above 1500. The commonest type of infection was septicemia. Others were otitis media, meningitis, urinary tract infection (UTI), pneumonia and skin infections. *Table I* depicts the clinical pattern of infections.

Of the 31 bacterial isolates Gram negative bacilli (GNB) were the commonest (61%) while Gram positive bacilli (GPB) constituted 39%. *E. coli*, *Klebsiella*, *Pseudomonas*, *Acinetobacter* and *Citrobacter* were the important GNB isolated. GPB isolated were *Staphylococcus aureus* and coagulase negative *staphylococci*.

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TABLE I-Clinical Pattern of Infections in Leukemias

Infection	No.	%
Septicemia	8	28
Otitis media	7	24
Meningitis	5	17
Urinary tract infection	5	17
Pneumonia	2	7
Skin infections	2	7

Table II shows the bacterial isolates. The antibiotics indicated in GNB infections were cefotaxime (CFX), ciprofloxacin (CIPRO) and ceftazidime (CFZ). *Staphylococcus aureus* was sensitive to cloxacillin (CLOX) and cefotaxime. Coagulase negative *staphylococcus* was resistant to all the usual antibiotics. Of 33 cases, 16 cases expired (48%). Deaths due to infections were 9 (56%). Majority of deaths occurred during induction therapy. In culture proven cases, GNB were the pathogens causing mortality.

TABLE II-Bacterial Isolates in Leukemias

Organisms	No.
GNB	19
<i>E. coli</i>	8
<i>Klebsiella</i>	4
<i>Pseudomonas</i>	3
<i>Acinetobacter</i>	3
<i>Citrobacter</i>	1
GPB	12
<i>Staph. aureus</i>	9
Coag. negative <i>Staphylococcus</i>	3

Discussion

Although infection as a complication of leukemia is not new, the types of pathogens have changed during the last two decades and vary in different places. The majority of infections are caused by bacterial pathogens. The present study revealed that they are principally aerobic GNB like *E. coli*, *Klebsiella*, *Pseudomonas aeruginosa* and *Acinetobacter* in the order of frequency. The GPB involved are *Staphylococci*, both aureus and coagulase negative.

Schimff *et al.* have demonstrated that 47% of all infections in leukemia patients are caused by organisms acquired during hospitalization(1). In contrast to the present study, most western studies reveal GPB as the major pathogen. In a study by Choudhry *et al.*, GNB especially *E. coli* were the commonest isolates(2). Our observations are similar to this, 60% of the organisms being GNB.

The causes of mortality in childhood leukemias are bleeding, poor response to drugs and sepsis. The major cause of death (56%) in this study was Gram negative sepsis during induction phase. The goal of empirical antibiotic therapy is to protect against early mortality and morbidity from bacterial infections. Various studies have shown that no special regimen is of convincing superior efficacy. Our study reveals that majority of GNB isolated were sensitive to cefotaxime and ciprofloxacin and GPB to cefotaxime and cloxacillin. Hence third generation cephalosporins and penicillinase resistant penicillin is the preferred combination at the outset of an infection.

The most important factor predis-

posing to infection is a low granulocyte count(3). The present study shows a high incidence of bacterial infection in leukemia children even with normal granulocyte count. Empirical antimicrobial therapy is, therefore, recommended when these children are febrile even if the granulocyte count is normal.

Studies have demonstrated that total protective environment can reduce the number of infections in such children. However, the financial cost is prohibitive in a country like India. Psychologic stress and the emergence of resistant organisms are other disadvantages(4). Awareness of the problem in hospital personnel and parents and health education for possible preventive measures by hand washing and other hygienic measures may help. Prophylactic administration of antimicrobials is beneficial in this aspect. In a prospective study, ciprofloxacin was shown to be a better alternative to cotrimoxazole for preventing Gram negative infection in acute leukemias(5). However, -the administration of cotrimoxazole reduces

the incidence of *Pneumocystis carinii* infections.

In conclusion, infection especially by GNB is the major cause of mortality in childhood leukemias.

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Myelofibrosis Secondary to SLE and its Reversal on Steroid Therapy

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Systematic lupus erythematosus (SLE) often causes hematological abnor-

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