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Frequency of Gram-Positive Bacteria Isolated From Cancer Patients on Chemotherapy

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ABSTRACT

This was a descriptive, prospective study aiming to study the Gram-positive bacteria in the blood among cancer patient on chemotherapy. Fifty neutropenic cancer patients were studied. Five to 10 ml samples of blood from 50 patients were collected from each patient, and then the samples were inoculated into different culture media to isolate the pathogenic organisms and identified with biochemical test to differentiate between organisms. The culture media were; Blood agar; Macconky agar and Sabrouds agar. And then the samples of growth colonies confirmed, identified with biochemical tests as catalase and coagulase. And detection of organisms under microscope based on shape and color of each organisms. The study revealed that the frequency of Gram positive cocci species in neutropenic cancer patients which were represented in (12 cases) 24% of all 50 cases. It may be concluded, that the Staphylococcal infections, especially *Staphylococcus aureus* are significantly associated with neoplastic disease than other Staphylococcus Species, especially in patients with hematological malignancies as leukemia's.

INTRODUCTION

Nosocomial infections are infections acquired at the hospital, as evidenced by an incubation period of the infection that is less than the interval between admission and onset of symptoms. Severe nosocomial infections contribute significantly to the morbidity and mortality rates in hospitals1. Because of the large number of patients who acquire nosocomial infections annually, significant financial costs result (Andrei and Zervos, 2006, and Schabrun *et al.,* 2006). Cancer patients are more susceptible to infections associated with health care because of their compromised immune system, use of invasive technologies, and their being subjected to surgical operations and chemotherapy (Berrouane *et al*., 2000). New tools, aggressive practices, and

technologies for the treatment of cancer patients can facilitate the onset of infections by microorganisms that were once considered as nonpathogenic or saprophytic (Viscoli *et al*., 2003).

Institutions that provide care for cancer patients are expected to have higher rates of nosocomial infections than general care hospitals (Wisplinghoff *et al*., 2005). In most hospitals nowadays, there is a shift of the microbial spectrum of cancer patients from Gram-negative to Gram-positive, compared with the predominance of Gram-negative species in the 1960s and 1970s (Zinne, 1999 and Peshkin *et al*., 2002*)*.

There are factors that account for this surge in Gram-positive infections. For example, intensive chemotherapy leads to damage of the mucosal barriers, which increases the risk of infection with Gram-positive oral and GI flora (Zinner *et al.,* 1999, and Cruciani *et al.,* 1996*)*. In addition, the use of implantable intravenous catheters with cancer patients can facilitate the entry of organisms colonizing the skin into the bloodstream, and thus increase the rate of staphylococcal infections (Zinner, 1999).

Moreover, prophylactic antibiotics, which are active against Gram-negative enteric bacilli, exert a selective pressure that contributes to this increase in the rate of Gram-positive infections (Zinner 1999, 2003 and Kumashi *et al.,* 2003*)*. The purpose of the study was to express the distribution of Gram positive species among cancer patients on chemotherapy.

MATERIALS AND METHODS

The present study showed that the distribution of Gram positive species among cancer patients on chemotherapy. The study showed that, several microorganisms were isolated from 50 cancer patients receiving chemotherapy particularly those who are neutropenic. The organisms isolated in the cultures and identified with biochemical

This is a descriptive, prospective study aiming to study the Gram-positive bacteria in the blood among cancer patient on chemotherapy. Fifty neutropenic cancer patients were studied during the period from August 2013 – May 2014. Five to 10 ml samples of blood from 50 patients were collected from each patient, and then the samples were inoculated into different culture media to isolate the pathogenic organisms and identified with biochemical test to differentiate between organisms.

The culture media were; Blood agar; Macconky agar, then the samples of growth colonies confirmed, identified with biochemical tests as catalase and coagulase. Detection of organisms under microscope was based on shape and colour of each organism. Clinical specimens of blood were collected from patients at the National Cancer Institute (Sudan, Medani). Specimens were cultured on different media and incubated 37°C.

Data collected on each patient consisted of demographic data including patients age, gender, residence, clinical features, malignancies, and culture media are presented from Figures (1- 4), and sites of positive culture. Patients who had no evidence of infection on admission but developed signs of infection after at least 2 days of hospitalization were selected. Ethical approval to perform the study was obtained from the dean of (NCI) and Population. Patient consent was obtained before collection of specimens.

RESULTS

test; were Gram positive coccai in 12 cases (24%) and 38 cases (76%) with no growth.The most predominant organisms were staphylococcal species isolated from the blood was Saureus in both leukemic patients and solid-tumor cancer patients.

The study revealed that the frequency of Gram positive cocci species mainly

Staphylococcus aureus was increased among cancer patients, especially patients with hematological malignancies as leukemia's.

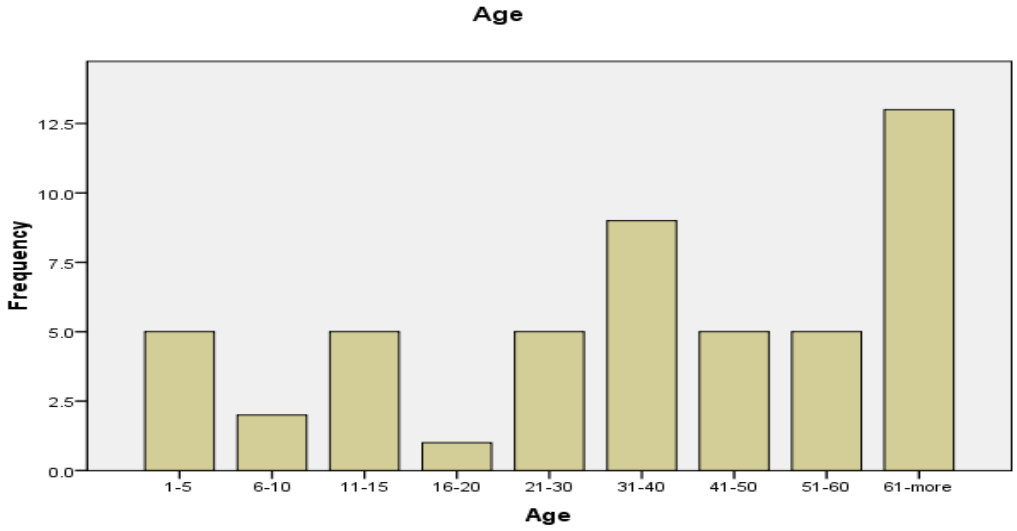

Figure 1: Distribution of Cancer Patients according to age

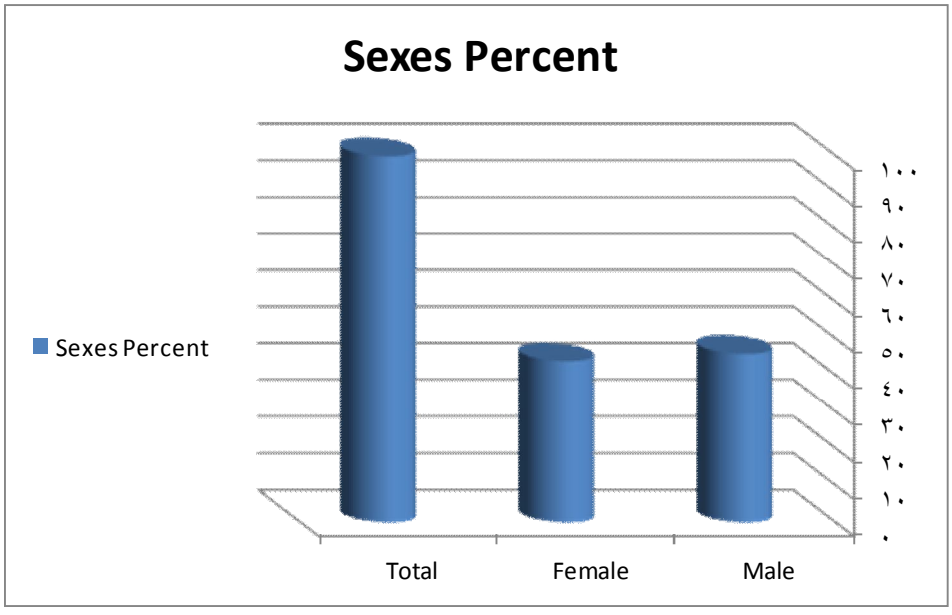

Figure 2: Distribution of gender among cancer pateints

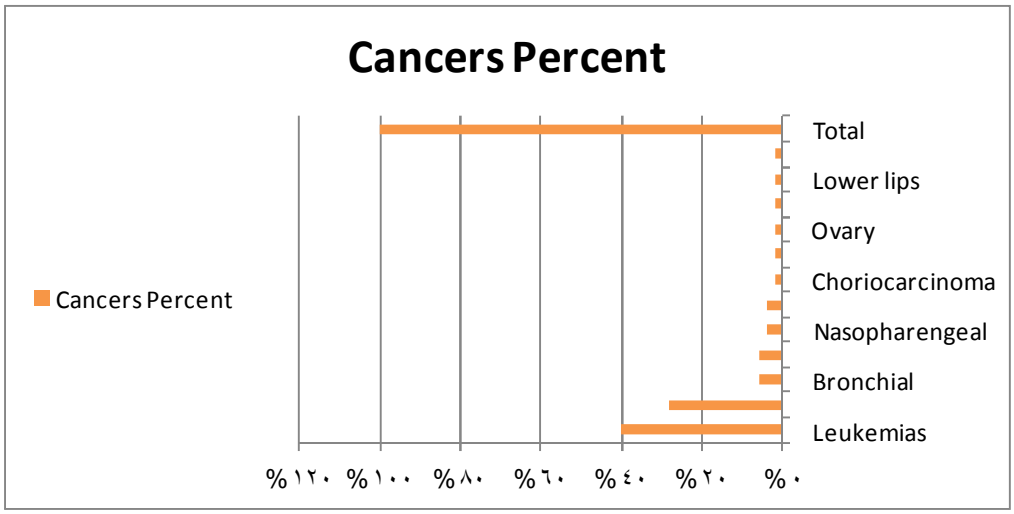

Figure 3: Types of Cancers among the examined patients

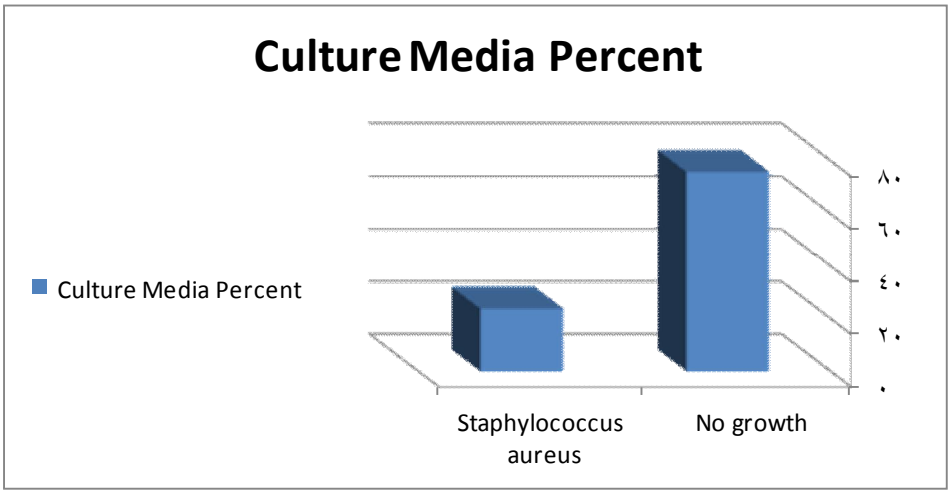

Figure 4: Percentage of isolated bacteria

DISCUSSION

In accordance with reports indicating the evolving predominance of Gram-positive bacteria in cancer patients (Zinner *et al.*, 1999 and Hughes *et al.*, 2002).We focused on the frequency of Gram-positive bacteria in cancer patients. As shown in Figure 4, Gram-positive bacteria were the most common blood isolates from cancer patients (24%). This study proved strong association between gram positive coccai especially Staphylococcus aureus infections among cancer patients on chemotherapy particularly those with leukemia and solid tumors. But this result disagrees with results from Lyytikainen *et al.,* (2002) who reported that 65% of nosocomial BSI were caused by Gram-positive bacteria. In addition, Madani *et al.*, (2002) reported that Gram-positive bacteria represented 75% of total blood

isolates in cancer patients. Moreover, the predominance of Gram-positive bacteria in isolates from cancer patients was shown in several other studies (Zinner *et al.,* 1999, Peshkin *et al.,* 2002, Hoheisel *et al*., 2003 and Jesus *et al.,* 2005). For blood stream infections (BSI), the main etiologic pathogens were CNS. Other studies have also reported CNS to be the most commonly isolated pathogen.

CONCULSION

It may be concluded, that the staphylococcal infections are significantly increasedin patients with neoplastic disease under chemotherapy, particularly those who neutropenic, and especially appeared in patients with hematological malignancies as leukemia's.

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