

Clinical Microbiology 2018: Prevalence of Asymptomatic Bacteria and Antibiotic Susceptibility Patterns of Bacterial Isolates among Cancer Patients and Healthy Blood Donors at the University of Gondar Specialized Hospital – Abiye Tigabu- University of Gondar

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Introduction: Background. Urinary tract infections are the common types of infections in the community and health care settings. Despite the widespread availability of antibiotics, urinary tract infection remains a worldwide therapeutic problem. It is a continuous and significant problem in cancer patients. **Methods.** A hospital-based comparative cross-sectional study was conducted on 240 study participants from January to June 2019. Socio demographic data were collected by a predesigned questionnaire and midstream urine samples collected using simple random sampling technique by using clean, sterile plastic cups and then inoculated onto CLED agar plates and incubated at 37°C for 24 hours. Urine culture was considered significant bacteriuria when colony forming units $\geq 10^5$ /mL of voided urine and a single pure colony suspended in nutrient broth and then subcultured onto a blood agar plate and MacConkey agar plate, incubated at 37°C for 24 hours for identification. Identification was done by using standard microbiological methods. Modified Kirby–Bauer disk diffusion technique was applied for antimicrobial susceptibility testing in accordance with CLSI 2018 criteria. Data were entered, cleared, and checked using Epi Info version 7 and exported to SPSS version 20 for analysis. The results were displayed using tables and figures. value <0.05 at 95% CI was considered as statistically significant. **Results.** The overall prevalence of asymptomatic bacteriuria in cancer patients was 23.3% while 6.7% in apparently healthy blood donors. *E. coli* (32.1%) was the commonest isolated uropathogenic bacteria followed by *Klebsiella* species (25.0%), *S. aureus* (21.4%), *Enterococcus* species (10.7%), *Serratia* species (7.1%), and *Enterobacter*

aerogenes (3.6%) in cancer patients. In apparently healthy blood donors, *E. coli*, *Klebsiella* species, and *S. aureus* were isolated from 75%, 12.5%, and 12.5%, respectively.

2. Methods: 2.1. Study Area, Study Design, and Population

The study was conducted at the University of Gondar comprehensive specialized referral hospital. Gondar town has 8 health centers, 21 private clinics, and one referral hospital with a projected population of 323,900. The hospital serves for more than five million people of Gondar town and its surroundings. The hospital has different departments and 500 beds for admitted patients. A hospital-based comparative cross-sectional study was conducted to assess the prevalence of asymptomatic bacteriuria and antibiotic susceptibility patterns of bacterial isolates among cancer patients and apparently healthy blood donors at the University of Gondar comprehensive specialized referral hospital, Northwest Ethiopia, from January to June 2019. Cancer confirmed patients and apparently healthy blood donors were the study population. However, study participants who were unable to give sociodemographic information currently on antibiotic treatment and had a recent history of antibiotic treatment for the last three weeks at the time of data collection were excluded.

2.2. Ethical Approval

Ethical approval was obtained from the University of Gondar ethical review committee. Written legal permission was obtained from medical directors of the University of Gondar compressive specialized hos-

pital. The objectives of the study were explained to the hospital directors, health-care providers, and patients; clarification also was given for patients before starting data collection. To keep confidentiality of information from participants, no personal identifiers were recorded in the client information extraction predesigned form and data secured from participant records were not available to anyone except for the main investigator.

2.3. Sample Size and Sampling Technique

A total of 120 cancer patients and 120 apparently healthy blood donors were enrolled using simple random sampling technique, and we took a 1 : 1 ratio of cancer patients and apparently healthy blood donors.

2.4. Socio demographic Data and Urine Specimen Collection

A pretested questionnaire based on postulated risk factors was developed and modified to explore the objectives of the study. Then, socio demographic characteristics and other relevant information were collected. Urine specimens were collected by a laboratory technologist by instructing the patients to collect approximately 10 ml to 15 ml midstream urine in clean.

2.5. Laboratory Identification Procedures

Each urine samples were inoculated onto a Cysteine-Lactose-Electrolyte Deficient agar (CLED) (Oxoid Ltd., England) by using a calibrated, sterile, nonreusable plastic loop 1 μ l (0.001 ml) and incubated aerobically at 37°C for 18 to 24 hours to check the growth, and urine cultures were considered as significant bacteriuria when colony forming units (CFUs) were $\geq 10^5$ /ml of voided urine, and a single colony was picked and suspended in nutrient broth and then subcultured onto blood agar plate and MacConkey agar plate, finally incubated at 37°C for 24 hours for further identification. Bacterial identification was then done using standardized biochemical tests, namely,

indole production, lactose fermentation, hydrolysis of urea, citrate utilization, lysine decarboxylation, and motility test for Gram-negative bacteria and for Gram-positive bacteria, mannitol fermentation, and catalase and coagulase tests.

2.6. Antimicrobial Susceptibility Testing

A suspension of a pure colony from each confirmed culture isolate was performed by using 0.85% sterile normal saline, and the suspension was adjusted at 0.5% Mac Farland standard. Using a sterile cotton applicator stick, the suspension was distributed evenly on Muller-Hinton agar. Modified Kirby-Bauer disk diffusion technique was implemented for antibiotic susceptibility pattern using different antibiotics such as ampicillin (10 μ g), amoxicillin/clavulanate (30 μ g), ceftazidime (30 μ g), tobramycin (10 μ g), cefoxitin (30 μ g), vancomycin (30 μ g), tetracycline (30 μ g), penicillin (10 μ g), ciprofloxacin (5 μ g), norfloxacin (10 μ g), nitrofurantoin (300 μ g), nalidixic acid (30 μ g), and rifampicin (5 μ g). Then, we applied those antibiotics on Mueller-Hinton agar plate and incubated for 18–24 hours at 37°C. The zones of inhibition were measured, recorded, and interpreted as sensitive, intermediate, and resistant using the CLSI 2018 performance standards for antimicrobial susceptibility testing interpretation table. MDR isolates are bacterial strains which are non susceptible to greater than or equal to one antimicrobial agent in three or more antimicrobial categories.

2.7. Data and Laboratory Quality Control

The questionnaire was pretested before the actual study begins to make sure whether the questionnaire was appropriate and understandable. The collected data were checked daily for consistency and accuracy. Investigators were also following standard data collection process. Five percent (5%) of the prepared culture media were randomly selected and incubated aerobically for 24 hours at 37°C to check the sterility of the prepared culture media, and also known strains of *Staphylococcus aureus* (ATCC 25923).

2.8. Data Entry and Analysis

Data were entered to EPI Info version 7 to check data completeness and data clearance and then transferred to SPSS version-20 for analysis. The characteristics of the study populations were summarized using frequencies, mean, and standard deviation. Binary logistic regression was used to determine the strength of the association between variables. Moreover, adjusted odds ratio was computed using multivariate logistic regression for variables with value ≤ 0.2 to control confounding variables. value ≤ 0.05 was considered statistically significant at 95% CI.

3. Results

3.1. Socio demographic Characteristics

In this study, a total of 240 study participants were

included. Of these, 50% (120/240) were cancer patients and 50% (120/240) were apparently healthy blood donors. Among cancer patients, 58.3% (70/120) were females and 41.7% (50/120) were males, and also among apparently healthy blood donors, 68.3% (82/120) were males and 31.7% (38/120) were females. The majority, 61.7% (74/120) of cancer confirmed patients were from an urban resident, while the rest, 67.5% (81/120) apparently healthy blood donors were from a rural resident. Most of the cancer confirmed patients, 32 (26.7%), had breast cancer followed by colon cancer, 30 (25%). The mean age of the study subjects was 42 years with a range of 3–80 years. 35% (42/120) of cancer patients belonged to 41–60 years of age while 38.3% (46/120) of apparently healthy blood donors belong to 21–30 years of age.