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Antibiogram assay of *E.coli* isolated from pus samples at lady reading hospital Peshawar

Asad Ali[1], Muhammad Shahbaz[2], Muneeba Wali[3], Muhammad Musaddiq[4], Umair Wali Khan[5], Mir Sadiq Shah[6], Nadia Mubarik[7], Taj Muhammad[8], Hikmat Ullah[9], Ali Ahsan[*1, 10]

[1]*Institute of Microbiology and molecular genetics, University of the Punjab Quaid-I-Azam Campus Lahore 54590, Punjab, Pakistan*
[2]*Assisstant Bacteriologist, Drugs Testing Laboratory, Multan, Punjab*
[3]*Department of Allied Health Sciences, Institute of Integrative Biosciences, CECOS University, Pakistan*
[4]*Department of Anesthesiology, Khyber Teaching Hospital, Peshawar*
[5]*Department of Orthodontics, Altamash Institute of Dental Medicine*
[6]*Department of Zoology, University of Science and Technology Bannu, Bannu-28100, Khyber Pakhtunkhwa, Pakistan*
[7]*Institute of Biotechnology and Genetic Engineering, The University of Agriculture, Peshawar*
[8]*Department of Microbiology, Abasyn University Peshawar*
[9]*Department of Microbiology, Kohat University of Science and Technology, Kohat*
[10]*Instituite of Medical Laboratory Technology, Faculty of Allied Health Sciences, University of Lahore, Defence Road Campus, 1-km Defence Road, Off Bhobtian Chowk, Lahore Punjab, Pakistan.*
Corresponding Author: Ali.ahsan@mlt.uol.edu.pk

Abstract
Background: Pyogenic infections are caused by both aerobic and anaerobic bacteria, which are widespread in the hospital setting and result in severe morbidity, extended hospitalization and a massive financial burden.
Objective: To determine the antbiogram assay of *E.coli* isolated from pus samples.
Methodology: This was prospective cross sectional study conducted at the Diagnostic Laboratory Lady Reading Hospital, Peshawar for duration of one year from November 2020 to November 2021. From various patients, a total of 365 pus samples were obtained. At 37°C, samples were incubated aerobically for 24 hours after being inoculated on MacConkey agar. The pus isolates were tested for antimicrobial susceptibility using the Kirby-Bauer disk diffusion technique, as recommended by the Clinical and Laboratory Standards Institute, and Mueller Hinton agar was used for antibiogram assay.
Results: Out of 365 pus samples *E.coli* was isolated from 36 (9.86%) samples. Amikacin and tobramycin were 100% sensitive to *E.coli* while it was 100% resistant to Cefuraxime and cephradine.
Conclusion: Our study concludes that that the most effective antibiotics for *E.coli* in pus samples are Amikacin and tobramycin. Our research proposes that regular antibiotic susceptibility testing be performed for the purpose of determining appropriate empirical medication treatment and management.
Keywords: Antibiogram assay; *E.coli*; Pus; Resistance

Introduction

Skin and soft tissue infections resulting from trauma or burn injuries or surgical treatments are accompanied by the development of pus that is composed of dead cells, cell debris, and necrotic tissues [1-3]. Pyogenic infections are caused by both aerobic and anaerobic bacteria, which are widespread in the hospital setting and result in severe morbidity, extended hospitalization, and a massive financial burden. Resistance to various antimicrobial agents and its fast dissemination among dangerous bacterial isolates are both regarded as serious concerns to public health across the globe. As a result of widespread mis-prescription and inappropriate dosing regimens, multidrug-resistant gram-negative have been linked with pyogenic infections in hospitals [4-6]. Due to restricted treatment choices and hesitant discovery of new antibiotic classes, the rapid evolution of multidrug-resistant bacteria presents a severe danger to global public health [6, 7].

Antibiotic resistance in *E. coli* has been observed all over the globe, and rising resistance rates in *E. coli* are becoming a serious issue in both developed and developing nations [7, 8]. Antibiotic resistance is on the increase, making illness treatment more difficult. In general, instances with severe symptoms are treated without bacteriological examination in up to 95% of cases [9]. *E. coli* occurrence and susceptibility profiles indicate large regional variances as well as significant disparities in different populations and settings [10]. The aim of this study was to isolate the *E.coli* from pus sample and to then to determine their antibiogram profile.

Materials and Methods

This was prospective cross sectional study conducted at the Diagnostic Laboratory Lady Reading Hospital, Peshawar. The study duration was one year from November 2020 to November 2021. The study approval was given by the ethical and research committee of the hospital. A consent form in written was taken from all the participants of the study. Totally, 365 pus samples were obtained from different patients with wounds. At 37°C, samples were incubated aerobically for 24 hours after being inoculated on MacConkey agar. Gram staining, colony features, and conventional biochemical tests were used for identification. A single colony from MacConkey agar was selected and inoculated on nutrient agar. It was incubated for 24 hours at 37°C. The culture was utilized to conduct biochemical testing and antibiotic susceptibility tests after overnight incubation period. The pus isolates were tested for antimicrobial susceptibility using the Kirby-Bauer disk diffusion technique, as recommended by the Clinical and Laboratory Standards Institute, and Mueller Hinton agar was used for antibiogram assay. All the data was analyzed statistically by using SPSS version 23.

Results

From different wards of the hospital, a total of 365 pus samples were collected. Out of 365 pus samples 230 (63.01%) samples were from male patients while 135 (36.99%) samples were from female. (Figure 1) The mean age in our study was 28.33 (4.12) years with minimum age of 19 and maximum age of 41 years. The overall prevalence of *E.coli* in pus samples was 9.86% (n=36) samples. (Figure 2) Amikacin and tobramycin were 100% sensitive to *E.coli* while it was 100% resistant to Cefuraxime and cephradine. 50% of the positive samples show intermediate resistance to ampicillin and tetracycline. (Table 1)

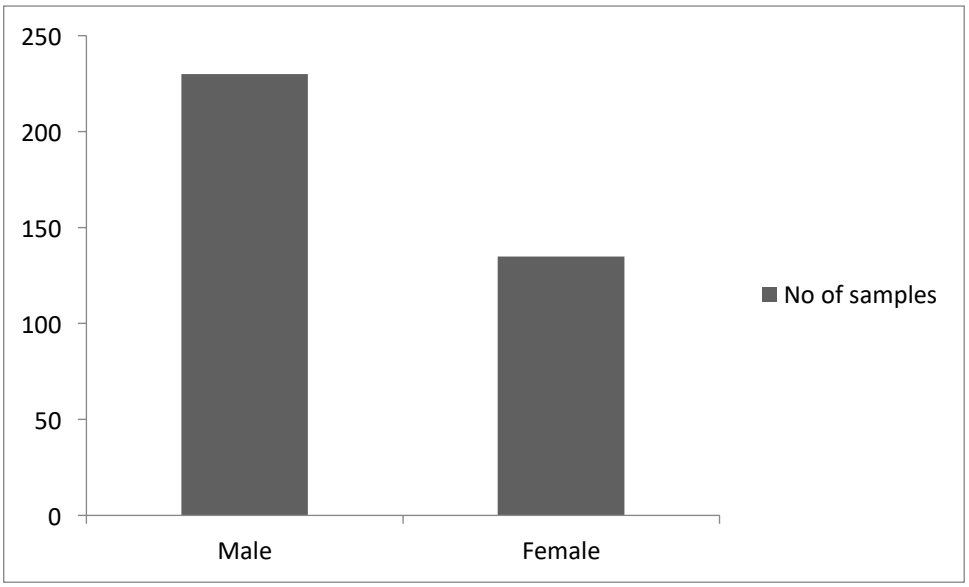

Figure 1: Gender wise distribution of samples

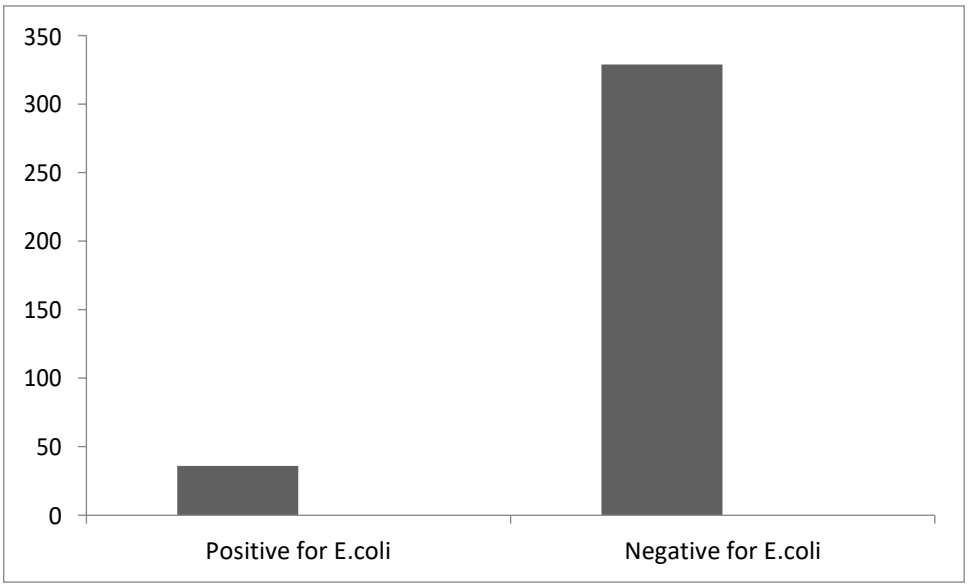

Figure 2: Prevalence of *E.coli in* pus samples

Table 1: Antibiogram profile of *E.coli* from pus samples

Name of antibiotics	Sensitive	Resistance	Intermediate
Amikacin	100%	00	00
Tobramycin	100%	00	00
Cefuraxime	00	100%	00
Cephradine	00	100%	00
Ampicillin	00	50%	50%
Tetracycline	00	50%	50%

Discussion

Antimicrobial resistance has grown in *E. coli* globally, and its susceptibility patterns exhibit significant regional heterogeneity, as well as demographic and environmental variables [11].

In this study, a total of 365 pus samples were collected from different wards of the hospital. Out of 365 pus samples 230 (63.01%) samples were from male patients while 135 (36.99%) samples were from female. The larger proportion of male patients (63.01%) than female patients in the pus samples obtained might be owing to males engaging in more outside activities, such as playing, as opposed to females, and having more possibilities of getting into accidents while doing so. Mahat et al. (2017) and KC et al. (2017) did comparable studies that backed up this conclusion (2013) [12, 13]. The overall prevalence of *E.coli* in pus samples was 9.86% (n=36) samples. In accordance to these findings, other studies also reported comparable results [14, 15]. Amikacin and tobramycin were 100% sensitive to *E.coli* while it was 100% resistant to Cefuraxime and cephradine. 50% of the positive samples show intermediate resistance to ampicillin and tetracycline. *E. coli* has a significant level of antibiotic resistance in this study. The results are in line with those of prior studies [16]. The resistance rates found in this research are greater than Khan et al. findings [17], but lower than Iqbal and Patel [18] and Okonko et al. [19] findings. A research in Ethiopia found that *E. coli* had a high degree of resistance to tetracycline [20], while a study in Slovenia found that *E. coli* had a high level of resistance to erythromycin [21]. This research demonstrates a significant incidence of antibiotic-resistant bacteria in pus samples taken from patients in a tertiary care hospital setting. Our data show that *E. coli* is the most common bacterium found in pus bacterial isolates. The incidence and antibiotic resistance profiles of pyogenic bacterial isolates vary a lot depending on where you live and what kind of weather you have. It has been suggested that patients' neglect, insufficient treatment regimens, antibiotic usage, self-prescription, and misprescription, as well as a lack of regional antibiogram data, are all contributing factors to the high levels of drug resistance seen in *E. coli* isolates from pus samples in this research and numerous other related reports. Antimicrobial susceptibility profiles of clinical isolates are being updated to help not only create the best dosing regimen and treatment plan for wound infections, but also to combat the rapidly growing threat of antibiotic resistance.

Conclusion

Antimicrobial resistance to Cefuraxime, Cephradine, Ampicillin, and Tetracycline was found at high levels in this research study. Our study concludes that that the most effective antibiotics for *E.coli* in pus samples are Amikacin and tobramycin. Our research proposes that regular antibiotic susceptibility testing be performed for the purpose of determining appropriate empirical medication treatment and management.

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