

Co-Relation of Biofilm Production with Multidrug Resistant Uropathogenic Klebsiella Pneumoniae Isolates and Their Antibiotic Susceptibility Patterns.

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ABSTRACT

BACKGROUND: Urinary tract infection because of antibiotic resistance is posing a serious health threat and biofilm formation being the leading root for the antibiotic resistance. The current study was intended to detect biofilm production by uropathogenic MDR klebsiella pneumoniae strains.

METHOD: The present study was conducted in the department of Microbiology of Maharishi Markandeshwar institute of medical science and research, Mullana, intended to detect biofilm formation in Multidrug-resistant uropathogenic Klebsiella pneumoniae isolates by using Tissue Culture plate Method, Tube adherence method and Modified Congo Red Agar Method.

RESULT: Out of total 550 samples, 23.2%(128) was uropathogenic. Out of 128 samples 60 samples were klebsiella pneumoniae strains, which were multidrug resistant (cephalosporins and fluoroquinolones). The rate of biofilm producers were 38(63.33%), detected by three methods. In which, Modified Congo Red Agar Method was best 36(60%) followed by Tube adherence method 33(55%) and Tissue Culture Plate Method 28(46.67%). In current study, the data on antibiogram revealed that Imipenem (73.68%) followed by Amikacin (68.42%) and Nitrofurantoin (52.63%) were most effective antibiotic for biofilm producing Multidrug-resistance Klebsiella pneumoniae.

CONCLUSION: So eventually we can conclude that the urine isolates especially Multidrug-resistance Klebsiella pneumoniae should be screened for biofilm production and antibiotic sensitivity testing should be done to determine antibiotic policy in the hospital.

Key words: Biofilms, Klebsiella pneumoniae, multi drug resistant.

INTRODUCTION

The penchant of biofilms has escalated in current years due to a notable increase in antibiotic resistance among microorganism recovered from hospitalized patients especially for critically ill patients. As per the recent public

announcement by National institute of Health, biofilms are responsible for more than 80% of all microbial infections¹. Urinary tract infection (UTI) is the foremost type & K. pneumoniae is the most notorious organism in hospitalized patients

METHOD

The current study was conducted on 60 strains of *Klebsiella pneumoniae*, resistant to cephalosporins and fluoroquinolones from patients of urinary tract infection, in the deptt of microbiology, MMIMSR, Mullana, Ambala. Ethical clearance was taken from the ethical committee. The strains were detected and subjected to biofilm formation by – **Tissue culture plate method, Tube Adherence method and Modified Congo agar method.**

RESULTS

Out of total 550 urine specimens processed, 128 (23.2%) were *klebsiella pneumoniae* (table I). Out of these strains 60(46.8%) were MDR (table II). 38(63.33%) isolates of MDR *klebsiella pneumoniae* showed Biofilm production (Table III). All the MDR *klebsiella pneumoniae* strains, which were isolated in the present series, were tested against various antibiotics. Imipenem came out to be the most sensitive drug against biofilm producing MDR *klebsiella pneumoniae*. The other two sensitive drugs were Amikacin(68.42%) and Nitrofurantoin (52.63%) (Table IV).

DISCUSSION

UTIs are considered to be one of the most common infections

encountered among the hospitalized patients and otherwise as well and *klebsiella pneumoniae* is reportedly the second most common causative agent of the same, if the organism is associated with biofilms have always been a challenge for treating physicians. In **existing study** *Klebsiella pneumoniae* came out to be 23.2% (Table I), which was well accordance with the studies by **Shaifai I et al** and **Akram M et al** where the positivity rate of uropathogenic *klebsiella* was 21.6% and 22% respectively³. The rate varies from region to region. Antibiotic resistant bacteria are one that are not exterminated by antibiotics. They are able to sustain themselves and even procreate in the presence of an antibiotic. Detection of resistant strains would enhance empirical treatment of UTI by clinicians. In **existent study**, rate of MDR uropathogenic *klebsiella pneumoniae* was 46.8% (Table II). It is supported by the studies done by **Chatterjee M et al**⁴ and **Kumar CN et al**⁵ in which resistance rates to above mentioned groups came out to be 48.5% and 50.4% respectively. Biofilm production is a way through which bacteria combat the effect of antibiotics and it makes bacteria almost impossible to be eradicated. Off late, biofilm is getting produced at an alarming rate further enhancing the need to be detected

and treated. In current study, positivity rate of biofilm producing klebsiella pneumoniae was 63.33%, which is in accordance to studies done by **Nivedhita S et al⁶** and **Promodhini S et al⁷** (Table III). The most disappointing fact about biofilm forming bacteria is their ability to be resistant to most of the drugs. The current study has included klebsiella pneumoniae strains already resistant to cephalosporins and fluoroquinolones. This makes it essential to look for the drugs, which should be effective against such bacteria. In the existent study, sensitivity to Imipenem were (73.68%) and Amikacin (68.42%). It is concordant with the study done by **Abdallah NMA et al⁸** in which the above mentioned drugs were most sensitive for biofilm forming uropathogenic gram negative bacteria. This is probably due to the fact that amikacin and imipenem along with other chosen drugs in the study like sulphurazole and piperacillin and tazobactam are not commonly administered in UTI as compared to cephalosporins and fluoroquinolones. (Table IV)

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TABLE I: RATE OF KLEBSIELLA PNEUMONIAE ISOLATES IN URINE SAMPLES

Total number of sample processed	Number of klebsiella pneumonia isolates
550	128(23.2%)

TABLE II:RATE OF UROPATHOGENIC KLEBSIELLA PNEUMONIAE ISOLATES RESISTANT TO CEPHALOSPORINS AND FLOROQUINOLONES.

Total strains of klebsiella pneumonia present	Resistant to cephalosporins and floroquinolones
128	60(46.8%)

TABLE III: RATE OF BIOFILM PRODUCING MULTIDRUG RESISTANCE UROPATHOGENIC KLEBSIELLA PNEUMONIAE

Multi drug resistance klebsiella pneumoniae	Biofilm producers (by all three methods)
60	38(63.33%)

TABLE IV: ANTIBIOTIC SENSITIVITY PATTERN OF BIOFILM PRODUCING UROPATHOGENIC KLEBSIELLA PNEUMONIAE.

Antimicrobial agents	Percentage of sensitivity (n=38)
Amikacin	26(68.42%)
Imepenem	28(73.68%)
Nitrofurantoin	20(52.63%)
Piperacillin & tazobactam	8(21%)
Gentamycin	5(13.1%)
Sulphurazole	1(2.6%)