

RECKLESS USE OF RESERVED ANTIMICROBIALS: AN UNETHICAL PRACTICEREENA SACHAN¹, ABHISHEK SINGH², RAJNI CHOUDHARY³¹ASSOCIATE PROFESSOR AND HEAD, DEPARTMENT OF MICROBIOLOGY, MLNMC, PRAYAGRAJ²ASSISTANT PROFESSOR, DEPARTMENT OF PULMONARY MEDICINE, MLNMC, PRAYAGRAJ³JUNIOR RESIDENT, DEPARTMENT OF MICROBIOLOGY, MLNMC, PRAYAGRAJ**Corresponding Author****RAJNI CHOUDHARY**JUNIOR RESIDENT, DEPARTMENT OF
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ABSTRACT

Introduction: Over last 60 years, pathogenic bacteria have evolved towards AMR. Antibiotics “against life” means that these drugs extracted from the living creatures and used to kill or attenuate bacteria. Antibiotics are truly a ‘miracle’ drugs that can save countless life but its irrational use and often inappropriate prescription make it an abused drug or drug under threat. AMR is not only eroding the effectiveness of antibiotics but also may affect the health and economic implementation of each and every one of us. It is necessary to follow the regulations for antibiotic use and misuse in country.

Material and Method: A retrospective study was conducted in the Department of Microbiology MLNMC, Prayagraj from March 2022 to February 2023. Urine samples were processed in CLED media for bacteriological identification. Lawn culture in MHA was done following Kirby-Bauer disc diffusion method and antibiotic sensitivity was reported as per CLSI M-100 (32nd Edition).

Result: Total 5,846 urine samples were processed for bacteriological identification and its antimicrobial sensitivity test. Total growth identified were 2,221. Out of which 200 were positive for *Klebsiella* spp. and among these 160 were Extended Spectrum β -lactamase (ESBL) producer.

Conclusion: Despite of definitive policies and guidelines for appropriate use of antimicrobials at National level and monitoring for rational use of antibiotics we found that 80% of *Klebsiella* spp. isolates were ESBL producers.

Key words: antibiotics, irrational use, unethical practice, AMR.

INTRODUCTION

Antibiotics “Against Life” means that these drugs are extracted from living organism and are used to kill or attenuate bacteria ⁽¹⁾. It’s truly a miracle drug that saves countless life but its irrational use and often inappropriate prescription makes it as abused drug ⁽²⁾. Over last 60 years pathogenic bacteria have evolved towards antimicrobial resistance. The current worldwide increase in antimicrobial resistance and simultaneous downward trend in development of new antibiotics have serious health and economic implications. The effective antibiotics which relived humans from disease is under threat! ⁽³⁾.

The increased antimicrobial resistance is a result of many factors, but the most important cause is increased irrational use of the antibiotics, particularly for indications that do not require such therapy. Unlike other developed countries, in India doctor’s prescriptions are kept by patients and not by pharmacists, incorrect dose, lack of education, pharmaceutical marketing, over the counter sale (OTC) of drugs are some of the examples which can lead to inappropriate and increased use of antibiotics ⁽⁴⁾.

In 1956 Multi Drug Resistant Tuberculosis (MDR-TB) was reported. Methicillin-Resistant *Staphylococcus Aureus* (MRSA) were isolated from clinical sample in 1960. *Escherichia. coli* showed high-resistance to Extended spectrum- β -Lactamase (ESBL) from 2004-2007. In the year 2006, Extensively Drug-Resistant Tuberculosis (XDR-TB) turned into dreaded Totally Drug-Resistant Tuberculosis (TDR-TB). In 2008, New Delhi Metallo- β -Lactamase (NDM) enzyme was first reported in New Delhi is now evident worldwide. In the year 2014, *Salmonella typhi* were found to be resistant to fluoroquinolones, whereas in 2016 Superbugs were reported.

In the year 2019 WHO released a guideline for reserved group of antibiotics which included Amikacin, Aztreonam, Azithromycin, Amphotericin, Cefotaxime, Ceftazidime, Caspofungin, Fluconazole, Levofloxacin, Linezolid, Tigecycline, Tobramycin, Vancomycin, Meropenem and Imipenem.

AIMS AND OBJECTIVE

To find out the most common microorganisms and drug sensitivity in patients suspicious of urinary tract infection (UTI) and to find out the use of reserved antibiotics.

MATERIAL AND METHODS

A retrospective comparative study was done in the Department of Microbiology, MLN Medical College, Prayagraj.

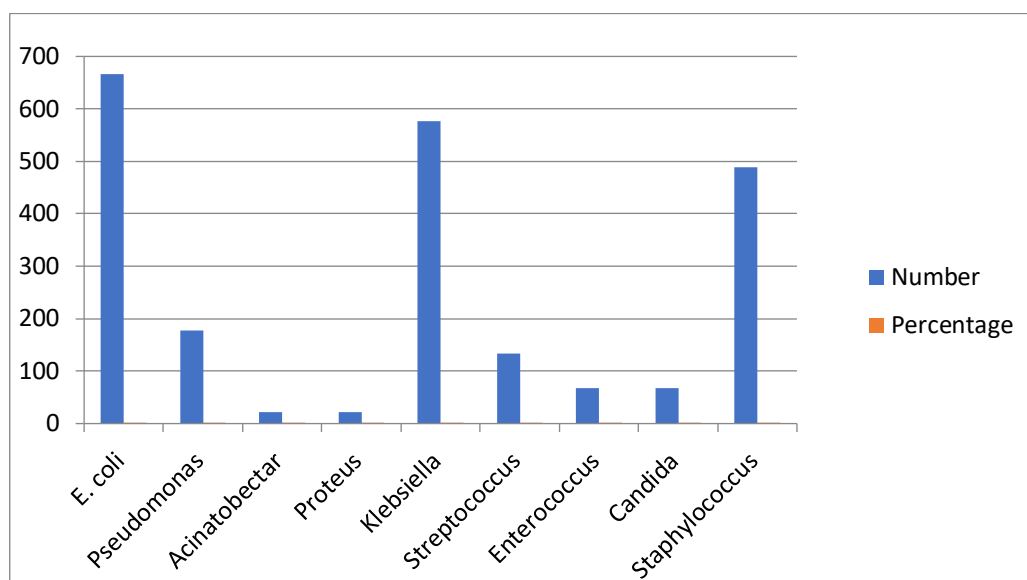
Study period: From March 2022 to February 2023 and data was retrieved from the records.

Sample size and sampling techniques: There were 5,846 urine samples processed and bacteriological isolation was done by surface streak in CLED media. Biochemical tests like indole, citrate, oxidase, catalase, coagulase was done for bacterial identification. Lawn culture in MHA was done followed by Kirby-Bauer disc diffusion method. Antibiotic sensitivity was reported as per CLSI M-100 (32nd Edition) guideline. Control strains used as were *E. coli* (ATCC25922), *S. aureus* (ATCC25923) and *P. aeruginosa* (ATCC27853)

All urine samples suspected of urinary tract infection were included in this study and all non-uropathogenic organisms were excluded.

RESULT

Out of 5,846 cultured urine samples 2,221 showed significant bacteriuria and the most common organisms identified were *Escherichia. coli*- 666 (30%), *Klebsiella spp.*- 577 (26%), *Staphylococcus aureus*- 489 (22%), *Pseudomonas aeruginosa*- 178 (8%), *Streptococcus spp.*- 133 (6%), *Candida albicans*- 67 (3%), *Enterococcus spp.*- 67 (3%), *Acinetobacter spp.*- 22 (1%) and *Proteus spp.*- 22 (1%).



Antimicrobial Susceptibility Test:

DISC	TO B	CIP	PIT	IP M	A K	A/ S	C Z	NI T	F O	N X	MR P	A T	C T X	C X	GE N	C A Z	T E	C D	P	T E I	L Z	C O T	E
<i>E. coli</i>																							
S	-	21	78	80	70	50	39	84	83	29	82	50	35	38	75	-	45	-	-	-	-	81	-
R	-	66	22	10	20	38	55	10	15	72	12	50	40	50	19	-	10	-	-	-	-	10	-
<i>K. spp.</i>																							
S	-	52	64	78	70	23	27	75	86	32	100	100	40	20	80	-	54	-	-	-	-	78	-
R	-	26	4	0	17	52	68	15	12	50	0	0	50	80	20	-	12	-	-	-	-	16	-
<i>P. aeruginosa</i>																							
S	90	14	83	74	-	-	14	84	85	67	80	90	60	20	-	66	-	-	-	-	-	-	-
R	10	86	0	25	-	-	72	10	11	33	12	10	30	80	-	33	-	-	-	-	-	-	-
<i>S. aureus</i>																							
S	-	53	-	-	-	-	-	78	74	-	-	-	-	82	78	-	58	31	37	15	80	12	17
R	-	13	-	-	-	-	-	7	22	-	-	-	-	14	22	-	33	54	47	50	10	88	75

TOB- Tobramycin, CIP- Ciprofloxacin, PIT- Piperacillin-Tazobactam, IPM- Imipenem, AK- Amikacin, A/S- Ampicillin-Sulbactam, CZ- Cefazolin, NIT- Nitrofurantoin, FO- Fosfomycin, NX- Norfloxacin, MRP- Meropenem, AT- Aztreonam, CTX- Cefotaxime, CX- Cefoxitin, GEN- Gentamycin, CAZ- Ceftazidime, TE- Tetracycline, CD- Clindamycin, P- Penicillin, TEL- Teicoplanin, LZ- Linezolid, COT- Cotrimoxazole, E- Erythromycin

DISCUSSION

In our study we found that antibiotics like Amikacin, Linezolid, Meropenem and Imipenem were still highly sensitive but were more frequently used which will lead to resistance even to these drugs. Colistin was withdrawn from the market due to its toxicity but was reintroduced when no better option was available which is now used for a wide range of infections. First-line treatment options for patients with acute uncomplicated cystitis are Nitrofurantoin, Cotrimoxazole and Fosfomycin but these drugs are not routinely used. Instead, antibiotics like Amoxicillin/Clavulanate, Cefpodoxime are used which are not recommended for initial use are commonly seen in patient's prescription slip. Few cases have been reported where Nitrofurantoin and Fosfomycin are judiciously used in acute pyelonephritis where these drugs do not achieve adequate tissue levels outside the bladder. There are studies that showed the decline in the response of drugs like Meropenem from 80% between 2001-2003 to 19% during 2007-2009. To overcome this a combination drugs were introduced but sooner the pathogens developed resistance even to these life-saving combination drugs. Cases have also been reported that intravenous drugs are used more often where we can use simpler oral antibiotics e.g use of Amikacin is in routine practice where Faropenem given orally will just do the same job. In India where there is high burden of tuberculosis and TB having similar clinical presentation as Community Acquired Pneumonia (CAP) so fluoroquinolones are used empirically which can mask the diagnosis and delays in treatment of Tuberculosis.

CONCLUSION

Resistance begins when people take antibiotics for acute, self-limiting infections such as diarrhoea and fever. When this continues, bacteria become resistant to the antibiotics which leaves the physician with no other choice but to use an even stronger drug, until one day there won't be any drug to be used. Moreover, the risk of multiple organ failure will prevail on increasing the dose or using higher drug-bug combinations. On the other hands inadequate dose which is very common can lead a microbe to pull out new defence mechanism either by genetic changes or by mutation.

Antibiotics at any cost should be avoided in case of common cold, flue or other viral infections. It should also be limited in diarrhoeal diseases where oral rehydration solutions can do wonders. Minimize hospital stay as much as possible for better infection control. In case if we cannot wait for the result of culture sensitivity report we should use broad spectrum antibiotics first then switch to one for which the bacteria are specifically sensitive. AMR is new epidemic in India. Therefore, drugs should be used according to priority pathogens. It is said by some expert that we are moving back to the pre-biotic era but with these unethical practices sooner there will be a post-antibiotic era. The cupboard which should be full is nearly bare in terms of advancement of newer drugs.

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AUTHOURS CONTRIBUTION

REENA SACHAN: Concepts, Manuscript preparation, Manuscript editing

ABHISHEK SINGH: Design, Manuscript review

RAJNI CHOUDHARY: Data acquisition, Data analysis, Statistical analysis

CONFLICTS OF INTEREST

Author states that there is no conflict of Interest.

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