



ORIGINAL RESEARCH PAPER

Microbiology

PREVALENCE OF *KLEBSIELLA PNEUMONIA* IN VARIOUS CLINICAL SAMPLES AND ITS ANTIBIOTIC SUSCEPTIBILITY PATTERN IN PATIENTS ATTENDING TERTIARY CARE HOSPITAL, IN SOLAPUR, MAHARASHTRA.

KEY WORDS:

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ABSTRACT

Aims & Objective- To study the distribution of *Klebsiella pneumoniae* isolates from various clinical samples and its antibiotic susceptibility pattern in patients attending a tertiary care hospital.

Material & Method- Samples received in Microbiology department for Culture & sensitivity were processed and identified using biochemical tests, antibiotic susceptibility test was done to assess resistance pattern to various antibiotics.

Results- Out of 3254 samples received for culture & sensitivity between April 2018 to August 2018, growth was seen in 1291 (39.67%) samples. Out of which 134 (10.45%) samples showed growth of *Klebsiella*. Males 71 (52.98%) were more commonly affected by infections caused by *Klebsiella* then females 67 (50.0%). Most common age group affected was between 15 -45 years, maximum growth of *Klebsiella* was noted in IPD patients especially from Surgery department. *Klebsiella* (n=134) was most commonly isolated from wound swab 40(29.90%), followed by urine sample 32 (24.0%) and pus 23 (17.20%). *Klebsiella* isolates showed higher sensitivity to piperacillin-tazobactam, amikacin, imipenem, and fluoroquinolones. Maximum resistance was noted for ampicillin and ceftriaxone. About 47 (35.0%) of *Klebsiella* isolates were ESBL producers while 27 (20.0%) of *Klebsiella* isolates were MBL producers.

INTRODUCTION

Klebsiella is gram negative bacilli, non-motile,encapsulated, lactose fermenter belongs to the Enterobacteriaceae family¹. It is known to have several virulence factor like capsular polysaccharide, lipopolysaccharide and iron scavenger system (siderophores)². It is second most popular member of aerobic bacterial flora in human intestine³. *Klebsiella* is an important nosocomial pathogen most commonly associated with hospital acquired pneumonia, urinary tract infection, soft tissue infection and bacteraemia⁴.Hospital acquired infection caused by multidrug resistant strains (MDR) are often associated with increased morbidity and mortality among patients^{5,6}.

As the bacteria are known to have ability to easily transmit and acquire resistance from one bacteria to another therefore it poses great threat to public health⁷ in both community as well as hospital setting, resistance has emerged as worldwide threat even to common infections which has led to difficulty in treatment of such infections. This is an alarming situation in both developing as well as developed countries as this has led to limited therapeutic options for physicians to treat patients.

As these are common but notorious organisms to treat, it is essential to understand distribution of *Klebsiella pneumoniae* in various clinical samples and to understand antibiotic susceptibility pattern which will be important to implement effective infection control measures to prevent emergence of multi drug resistant strains and also help to formulate hospital based antibiotic policy

MATERIAL & METHOD-

Study was conducted for 6 months period between April 2018 to August 2018. All samples received in Microbiology department at a tertiary care hospital in Solapur, Maharashtra for Culture & sensitivity were processed by inoculation on culture media like blood agar, Mac conkey agar, CLED agar (in case of urine sample) and were incubated overnight, growth was noted thereafter, growth on Mac conkey agar or CLED agar showing lactose fermenters were further identified using standard biochemical tests, antibiotic susceptibility test was done using Kirby bauer disc diffusion method as per CLSI guidelines⁸, to assess resistance pattern to various antibiotics. Those isolates resistant to third generation cephalosporins and/or carbapenems were subjected to standard phenotypic tests for ESBL & MBL detection by using CLSI combined disc test for ESBL detection and Modified Hodge test for MBL detection respectively as per CLSI guidelines⁸.

RESULTS-

Out of 3254 samples received for culture & sensitivity between April 2018 to August 2018, growth was seen in 1291 (39.67%) samples. Out of which 134 (10.45%) samples showed growth of *Klebsiella*. Males 71 (52.98%) were more commonly affected by infections caused by *Klebsiella* then females 67 (50.0%). Most common age group affected was between 15 to 45 years as shown in table-1.

TABLE-1 Age wise distribution among patients

AGE GROUP (years)	NUMBER & PERCENTAGE (%)
<15	27 (20%)
15-45	62 (46%)
>45	45 (33%)

TABLE-2 Department wise distribution of *Klebsiella pneumoniae*

Department wise distribution	Number & Percentage (%)
Medicine	31 (23%)
Surgery	55 (41%)
Obstretics & Gynaecology	21 (16%)
Pediatrics	16 (12%)
Others	11 (6.5%)

Klebsiella was most commonly isolated from wound swab 40(30.0%), followed by urine sample 32 (24.0%) and pus 23 (17.20%) as shown in table-3 below.

Sample	Total Sample received (n=3254)	Growth Seen on culture (n=1291)	<i>Klebsiella pneumoniae</i> growth (n=134)
Blood	616	142	05
Sputum	338	83	13
CSF	121	12	03
Vaginal swab	142	54	05
Throat swab	22	07	04
Urine	810	231	32
Pus	551	325	23
Wound swab	473	346	40
Peritoneal fluid	39	23	04
Ascitic fluid	21	06	0
Pleural fluid	47	15	0

Tracheal aspirate	40	28	05
Corneal Button	10	06	0
Others	24	13	01

The antibiotic susceptibility pattern of *Klebsiella* isolates from various clinical samples shown in table-4.

TABLE-4 Antibiotic sensitivity pattern of *Klebsiella* isolates in clinical samples (n=134)

Antimicrobial agent	Disk concentration (µg)	No. of sensitive isolates	Percentage of sensitive isolates (%)
Ampicillin	10	18	13.43
Amikacin	30	51	38.0
Ceftriaxone	30	21	15.70
Ciprofloxacin	5	43	32.0
Imipenem	10	47	35
Piperacillin-tazobactam	100/10	101	75
Cotrimoxazole	1.25/23.75	40	54
Nitrofurantoin (for urine sample only) (n= 32)	300	12	38

TABLE-5 Distribution of ESBL & MBL producers among *Klebsiella* isolates

β lactamases producer	Total number	Percentage (%)
ESBL (Extended spectrum β lactamases)	47	35
MBL (Metallo β lactamases)	27	20

DISCUSSION

In the present study out of 3254 samples received, growth was seen in 1291 (39.67%) samples, of which 134 (10.45%) samples showed growth of *Klebsiella*. Study done by Sharanya K et al⁹ prevalence of *Klebsiella* was 13.16%, while study done by Priyadarshani et al¹⁰ showed low prevalence of *Klebsiella* isolation 7.1%.

In present study males 71 (52.98%) were more commonly affected by infections caused by *Klebsiella* then females 67 (50.0%). But the comparison is statistically insignificant.

In the present study most common age group affected was between 15 -45 years (46%) followed by age group > 45 years (33%). Studies done by Shiren rana et al¹¹ showed similar results as which may be attributed to more outdoor activity of this age group for employment and livelihood purposes. However studies done by Sharanya K et al⁹ showed maximum patient in age group more than 60 years.

In the present study maximum *Klebsiella* isolates were from Indoor patients especially from surgery department different studies have shown variation in department distribution however most of them have mentioned that *Klebsiella* is most commonly isolated from admitted patients this strengthens that view that *Klebsiella* is well established cause of nosocomial infection.

In the present study maximum isolates of *Klebsiella* were obtained from wound swab 40 (30%) followed by urine sample 32(24.0%) and pus sample 23(17.20%) as shown in table-3, however studies done by Sharanya K et al⁹ showed maximum *Klebsiella* isolates from tissue followed by ear swab, blood, pus/wound swab, sputum and urine sample. Sample wise distribution shows variations among different studies which may be attributed to population under study, geographical area, occupation, socioeconomic status of patient and awareness of hospital infection control practices among health care workers.

In the present study highest sensitivity of *Klebsiella* isolates was seen for piperacillin tazobactam 75%, followed by Amikacin 38%, Imipenem 35%, ciprofloxacin 32% as shown in table-4. Highest resistance was noted for Ampicillin 86.57% and

Ceftriaxone 84.30%.

ESBL has been reported from *Klebsiella* in various studies, in the present study ESBL producing *Klebsiella* were about 37% while MBL producer were 20%. As shown in table-5. Previous studies have shown low resistance to carbapenems but due to selective pressure and injudicious use of antibiotics *Klebsiella* now shows more resistance to carbapenems as compared to the past studies.

Variation in antibiotic susceptibility pattern may be due to geographical variation, climatic condition, variation in population under study, socioeconomic status, over use of antibiotics, availability of over the counter drugs, hygiene practices among population, and awareness among health care workers (HCW) about hospital infection control practices and hand hygiene.

CONCLUSION

Klebsiella is a well-established cause of nosocomial infection, which is usually multidrug resistant. It is important to know the distribution pattern and antibiotic sensitivity pattern in order to formulate hospital based antibiotic policy and antibiotic stewardship program. As majority of isolates were from indoor patients it is important that all health care workers adhere to standard infection control policies and should follow bundling in order to prevent device related infections. Awareness and regular vigilance on prevention of over use of drugs will help to combat multi drug resistant strains among patients admitted in hospital will also benefit patient by decreasing hospital stay and economic burden.

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