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Distribution of drug resistant bacteria among different age groups of UTI patients in Dhaka locality

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Abstract
Urinary tract infection (UTI) is very commonly occurred infection worldwide and also a frequently occurring nosocomial infection. Urinary tract infection can be caused by pathogenic bacteria and fungus but bacteria are the most prevalent while causing UTI. Some common bacteria causing UTI are *Escherichia coli*, *Proteus* spp., *Staphylococcus* spp., *Streptococcus* spp., *Pseudomonas* spp. This is occurred under some circumstances only because in normal condition it is not easy to get infected in the urinary tract for normal host defense mechanism of healthy individual. In the current study, about fifty UTI patients were selected randomly to detect the pathogen responsible for causing urinary tract infection. Antibiotic resistance pattern was also determined after proper identification of the responsible bacterial isolates. Among the 50 patients, seven bacterial isolates (*Escherichia coli*, *Pseudomonas* spp., *Klebsiella* spp., *Acinetobacter* spp., *Enterobacter* spp. and *Citrobacter freundii*) were found to be responsible to cause UTI. *Escherichia coli* were predominant in female patients whereas *Pseudomonas* spp. was predominant in male patients. Most of the infected patients were females (39 female patients out if 50). All pathogens were resistant to antibiotics. We used twenty two antibiotics and found only 3 isolates to be resistant to one antibiotic (Nalidixic acid) only. About 28 isolates out of 50 were found to ESBL producers. Three isolates of *Pseudomonas* spp. were found to be resistant to 21 antibiotics out of 22 used during this study. Advancements in new, susceptible drug development is very necessary to fight with these multidrug resistant pathogens.

Keywords: UTI, pathogenic bacteria, drug resistance

Introduction
Urinary tract infection (UTI) is an infection occurring specifically within the structures of urinary tract (1). In most cases bacteria is responsible for UTI which can often lead to blood infection as well as pyelonephritis in immunocompromsied patients (2). UTI can be both symptomatic and asymptomatic. In symptomatic cases, it can progress to bacteremia, sepsis and even death (3-6). The predominating bacteria responsible for causind UTI include uropathogenic *Escherichia coli*, *Klebsiellapneumoniae*, *Proteusmirabilis*, *Streptococcus agalactiae*, *Pseudomonas* spp., *Enterococcus faecalis*, *Streptococcus* spp., *Staphylococcus* spp., *Neisseria* spp. etc (7-9). It has been estimated that about 250 million people get infected with UTI worldwide (10-13). Females are more prone to UTI because of the very little anatomic distance between anus and urinary tract and also the shorter length of urethra compared to male counterparts (14-17). Females can easily encounter with UTI during sexual intercourse and child birth (18). Pregnant women are also prone to UTI due to urethral dilation and elevated glucose and amino acid in urine (19). Other factors responsible for UTI include age, multiparity, sexual activity, socioeconomic condition, immune status, catheterization etc (20-24).
Antibiotic resistance has been started to increase drastically due to frequent and often unnecessary use of antibiotics. Lack of proper knowledge of the threats of drug resistance of the pathogenic bacteria and lack of patient counseling during treatment often contribute this scenario (25-30). Antibiotic resistance is gained by selective pressure of antibiotics, production of extracellular enzymes inactivating or degrading antibiotics (for example, production of beta-lactamase, penicillanase), carrying genes for resistance (for example acquiring resistant genes by accumulation of R plasmid) (31-34). In the current study about 50 UTI patients seeking medical facilities were selected for urine sample collection. Identification of the bacteria responsible for UTI was determined followed by their antibiotic resistance pattern determination. The resistance pattern is a compulsory work to be done before treating the patients to get successful result in combating the UTI with proper administration of sensitive antibiotics.

Materials and Method
Study area and sampling
To carry out the study patients of different age groups were randomly selected who were seeking medical treatments. Patients among 1 year to 93 years old were selected while doing the study seeking for medical treatment were subjected. Both male and female counterparts were included while collecting the samples. Total 50 patients were selected who came for microbiological analysis for detection of UTI in the Dhaka locality. The study was conducted between the month of October, 2020 to May, 2021. Reason for using the sample from different time was to find the pattern of the circulating bacterial pathogens among the people. Urine samples were collected aseptically from the mid stream of urine in the sterile bottles provided by the diagnostic test centers and stored at 4˚C until transferring to culture media. Standard laboratory procedures were maintained strictly to prevent contamination and to avoid any hazards and transmissions.

Determination of pathogenic bacteria responsible for the urinary tract infection

After collection of urine samples, they were inoculated onto MacConkey agar plates and CLED (cysteine-, lactose- and electrolyte-deficient) agar plates to detect mostly gram negative bacteria. 10µl sample was spread over the both agar plates and incubated at 37ºC for 24 hours. After incubation period, the colonies were enumerated and subjected to biochemical identification (glucose fermentation, catalase tets, oxidase test, citrate utilization, urease production (35).

Antibiotic sensitivity of the isolated pathogens

Pathogenic bacteria found in the urine samples were further subjected to determine their antibiotic sensitivity patterns against the commonly prescribed antibiotics. About 22 antibiotics such as AMC- Amoxicillin (25µg), AK- Amikacin (30µg), CN- Gentamicin (10µg), NET- Netilimicin (30µg), ATM- Azithromycin (15µg), FEP- Cefepime, CFM- Cefotaxim (30µg), CAZ- Ceftazidime (30µg), CTX- Ceftriaxone (30µg), CPZ- Cefoperazone (75µg), IPM- Imipenem (10µg), MEM- Meropenem (10µg), NA- Nalidixic acid (30µg), NIT- Nitrofurantoin (300µg), TPZ- Piperacillin/tazobactam (100/10µg), TGC- Tygecyclin (15µg), CIP- Ciprofloxacin (5µg), SXT- Sulfamethoxazole/trimethoprim (25µg), CT- Colistin (10µg), DOX- Doxycycline (30µg), TE- Tetracycline, (30µg) were selected for this study. Mueller Hinton agar plates were used to make lawn of the pathogenic bacterial isolates followed by the placement of selected antibiotic discs over the lawn culture. The plates were then kept at 37ºC for 24 hours for incubation. After incubation, the plates were observed for the presence of the zone of inhibition and measured in millimeters (36).

Results and Discussion

Urinary tract infection (UTI) is quite common disease caused predominantly by bacteria with a varied degree of symptoms and complications all around the world (10, 17, 37, 38-40). Different studies showed different causative agents responsible for UTI including gram negative bacteria *Escherichia coli, Klebsiella* spp. as well as gram positive bacteria like *Staphylococcus aureus* (10, 37, 38, 41-43).

During the eight months (from October, 2020 to May, 2021) of study, e found seven different bacterial isolates responsible for causing urinary tract infection (UTI) in Dhaka locality. Among 50 selected cases, we found seven circulating bacterial pathogens. The most predominant bacteria was *Escherichia coli* (50% cases) (figure 1). *Pseudomonas* spp. and *Klebsiella* spp. were found in 18% and 16% cases respectively. Lowest cases were found for *Staphylococcus aureus* and *Enterobacter* spp. (both appeared in 2% cases only).

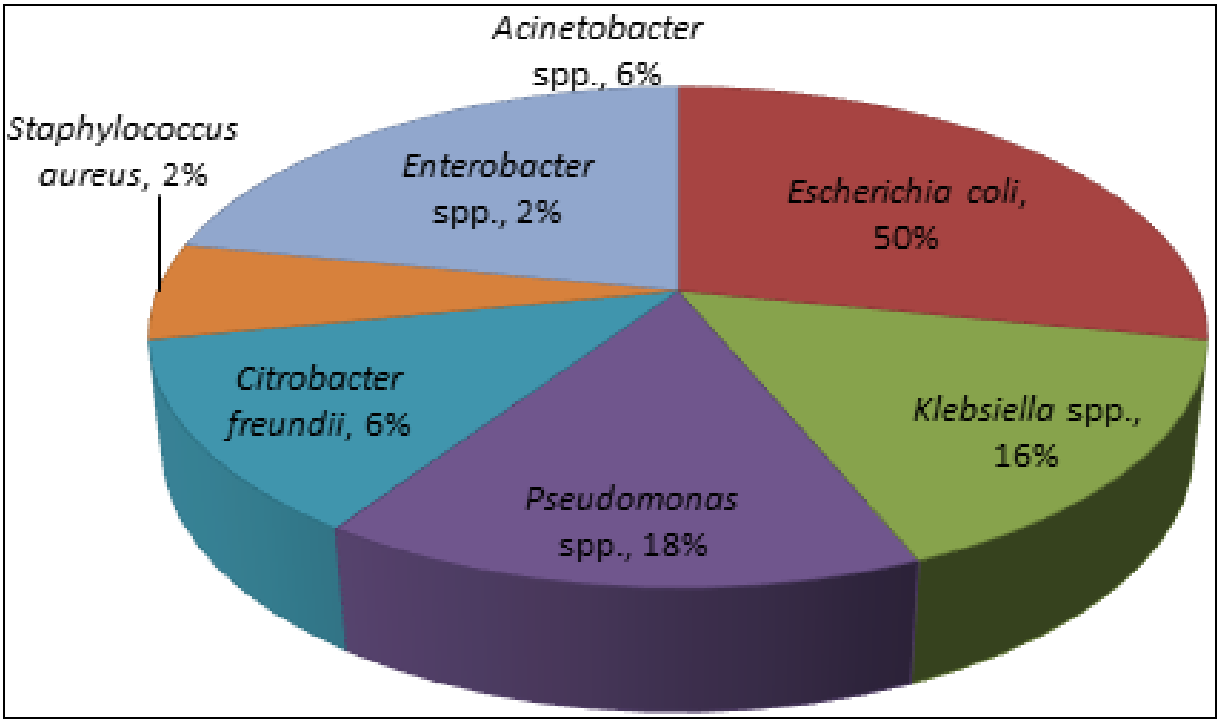

Fig 1: Percentage of bacterial causing UTI in Dhaka.

We have found that UTI was most common among the female than males. In the first month of study (October, 2020) we found only male patients but in all other months we found the higher number of female patients seeking diagnostic services for UTI cases. Highest number of UTI cases were found in November, 2020 (9 female cases and 2 male cases) (figure 2).

No significant association with the time and bacterial isolates were found.

But females were mostly infected due to their physiological conditions like anatomical position of the genital organ, shorter urethral length, vaginal pH, pregnancy, hormonal fluctuations al of these conditions make them more prone to UTI than males (16-19).

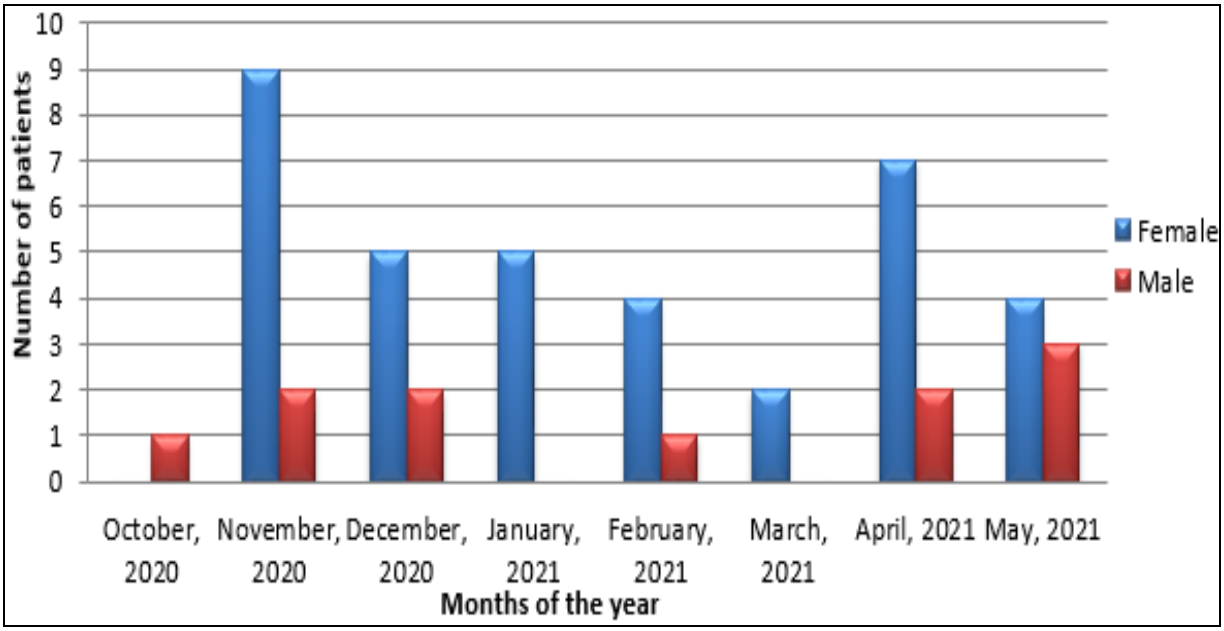

Fig 2: UTI cases among males and females from October, 2020 to May, 2021.

Among the 50 patients, highest number of cases belonged to 41 years to 80 years age group. Lowest number of infection cases were found in 0-20 years. In 21 years to 40 years range, only female UTI patients were found whereas between 81 years to 100 years age only male UTI patients were enlisted (figure 3).

As the age increases, males become more susceptible to UTI due to weakening of their immune status. Females showed more cases of UTI starting from adulthood to later period of ages.

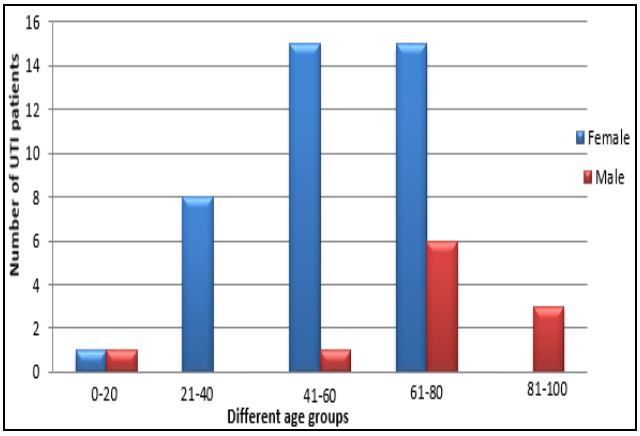

Fig 3: Number of male and female UTI patients in different age groups.

Among seven bacterial isolates causing UTI, three isolates- *Acinetobacter* spp., *Staphylococcus aureus* and *Enterobacter* spp. were found only in female patients. *Pseudomonas* spp. was mostly responsible for UTI in males. Females were more susceptible to *Escherichia coli* for UTI cases (figure 4).

Escherichia coli is a member of intestinal flora and often due to lack of hygiene and during sexual activity, often this bacteria get introduced into genitourinary tract which can cause UTI later on.

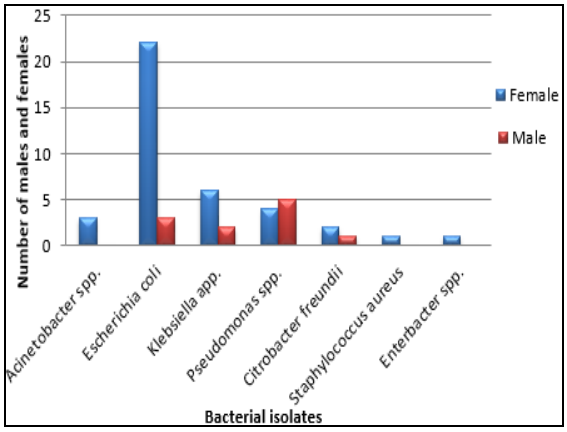

Fig 4: Distribution of bacteria among male and female patients.

During the current study, e found different bacteria causing UTI in different months randomly. *Escherichia coli* was highest during November, 2020 to February, 2021, for four consecutive months. In October of 2020, *Acinetobacter* spp. was the predominant one. In April, 2021- *Pseudomonas* spp. was found to cause UTI mostly than other bacteria (figure 5).

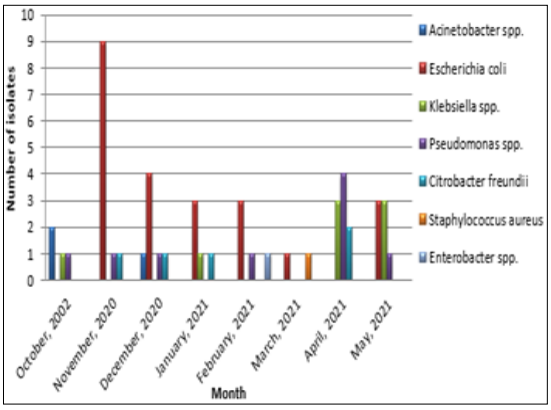

Fig 5: Distribution of bacterial isolates causing UTI in different times of the year**.**

Antibiotic resistance pattern towards some commonly prescribed antibiotics were determined to select the proper antibiotic of choice for treating the patients. But the significant increasing antibiotic resistance is making the treatment the treatment more challenging. As the pathogenic bacteria are becoming resistant, development of new drug of choice has become one of the major concerns.

Bacteria can gain resistance by different ways. *Neisseria gonorrhoeae* (caused by ribosomal mutation) showed resistance to cefixime, ceftriaxone (44, 45). Methicillin resistant *Staphylococcus areus* is a common pathogen causing many deaths in the whole world (46). *Pseudomonas aeruginosa* has another way (multidrug efflux mechanism) to gain antibiotic resistance (46-48). Different countries (for example- Ethiopia, Kosovo and South Croatia) are showing the scenario of drug resistance to nitrofurantoin, gentamycin, ceftriaxone (8, 11, 42, 43, 49, 50).

During antibiotic susceptibility testing, we found all of the isolates found in 50 patients showed resistance. Only three isolates showed the best result for being susceptible to all antibiotics but Nalidixic acid. *Escherichia coli* from patients no. 12 and 14, *Klebsiella* spp. from patient no. 48 were resistant to only Nalidixic acid. So these patients had a wide range of chemotherapeutic options for treatment. The most shocking result was found for *Pseudomonas* spp. Only *Pseudomonas* spp. from three patients (patient no. 3, 16 and 45) showed resistance to all antibiotics but colistin. So these patients are already possessing resistance for 21 antibiotics (except colistin).

So treating them is seems overwhelmingly difficult. Out of 50 patients, 28 patients were infected with ESBL (extended spectrum beta lactamase) producing bacteria. ESBL producing bacteria was found in patient no. 3, 6, 8, 11, 16, 18, 23-25, 29, 31-46, 49 and 50 (table 1).

Table 1: Antibiotic resistance of the isolates collected from 50 patients

Patient no	Date	Age	Sex	Bacteria	Sensitive antibiotics	Resistant antibiotics
1.	14.10.20	60Y	F	*Acinetobacter spp.*	AMC, AK, CN, NET, ATM, FEP, CFM, CAZ, CTX, CPZ, IPM, MEM, NA, NIT, TPZ, TGC.	CIP,SXT,CT,DOX,TE.
2.	15.10.20	65Y	F	*Klebsiella spp.*	AMC, AK, CN, NET, ATM, FEP, CFM, CAZ, CTX, CPZ, CT, MEM, DOX, TE, TGC.	CIP,SXT,NA,NIT,TPZ.
3.	15.10.20	84Y	M	*Pseudomonas spp.*	CT	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, TX, CPZ, CIP, SXT, IPM, MEM, NA, NIT, TPZ, DOX, TE, TGC
4.	29.10.20	75Y	F	*Acinetobacterspp.*	CT, DOX, CN, IPM, MEM, NET, TPZ, TE, TGC	AMC,AK,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,SXT,NA,NIT.
5.	05-11-20	32Y	F	*E.coli*	AK,CN,NET,ATM,FEP,CFM,CAZ,CTX, CPZ,CT,IPM,MEM,NIT,TPZ,DOX,TE,TGC.	AMC, CIP,SXT,NA
6.	09.11.20	55Y	F	*E.coli*	AK,CN,NET,ATM,FEP,CT,SXT,IPM,MEM,NIT,TPZ,DOX,TE,TGC.	AMC, NA,CFM, CAZ,CTX,CPZ, CIP,NA.
7.	17.11-20	70Y	M	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CT,IPM,MEM,TPZ,TGC.	CIP,SXT, DOX,NA,NIT,TE.
8.	20.11.20	65Y	M	*Pseudomonasspp.*	CT, IPM, MEM.	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,SXT,NA,NIT,TPZ,DOX, TE,TGC.
9.	21.11.20	68Y	F	*E.coli*	AMC, AK, CN, NET, ATM, FEP, CFM, CAZ, CTX, CPZ, CT, SXT, IPM, MEM, NIT, TPZ, DOX, TE, TGC.	CIP,NA.
10.	21.11.20	03Y	F	*E.coli*	AMC, AK, CN, NET, ATM, FEP, CFM, CAZ, CTXCPZ, CT, IPM, MEM, NIT, TPZ, DOX, TE, TGC.	CIP,SXT, NA.
11.	22.11.20	73Y	F	*E.coli*	AK,CT,CN,IPM,MEM,NET,TGC.	AMC,ATM,FEP,CFM,CAZ,CTX,CPZ, CIP,SXT,NA,NIT,TPZ, DOX,TE.
12.	22.11.20	60Y	F	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,SXT,IPM,MEM,NIT,TPZ, DOX,TE,TGC.	NA
13.	22.11.20	40Y	F	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTXCPZ,CT,SXT,IPM,MEM,NIT,TPZ,TGC.	CIP,DOX,NA,TE.
14.	24.11.20	65Y	F	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,SXT,IPM,MEM,NIT,TPZ, DOX,TE,TGC.	NA.
15.	29.11.20	48Y	F	*Citrobacter freundii.*	AK,CN,NET,ATM,FEP,CFM,CAZ,CTX, CPZ,CT,SXT,IPM,MEM,NIT,TPZ,DOX, TGC.	AMC,CIP,DOX,NA,TE.
16.	04.12.20	70Y	F	*Pseudomonas spp.*	CT	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ,CTX,CPZ,CIP,SXT,IPM,MEM, NA,NIT,TPZ,DOX,TE,TGC
17.	05.12.20	85Y	M	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ,	SXT,NA.

					CT,CPZ,CIP,CT,IPM,MEM,NIT,TPZ,DOX,TE,TGC.	
18.	14.12.20	60Y	F	*Acinetobacter spp.*	AK,CN,NET,ATM,FEP,CIP,CT,IPM,MEM,TPZ,DOX,TE,TGC.	AMC, CFM,CPZ,CTX,CAZ,SXT,NA,NIT.
19.	15.12.20	70Y	M	*Citrobacter freundii.*	ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,IPM,MEM,TPZ,DOX, TE,TGC	AK,AMC, SXT,CN, NA,NET,NIT
20.	23.12.20	61Y	F	*E.coli*	AK,CN,NET,ATM,FEP,CAZ,CTX,CPZ,CIP,CT,SXT,IPM,MEM,NIT, TPZ,DOX,TE,TGC.	AMC,CFM,NA
21.	23.12.20	71Y	F	*E.coli*	AK,CN,NET,ATM,FEP,CFM,CAZ,CTX, CPZ,CT,SXT,IPM,MEM, NIT,TPZ,DOX,TE,TGC.	AMC,CIP, SXT,NA.
22.	25.12.20	50Y	F	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,IPM,MEM,NIT,TPZ,DOX,TE,TGC.	SXT,NA.
23	01.01.21	55Y	F	*E.coli*	AK,CIP,CT,DO,CN,IPM,NIT,TE,TGC	AMC,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,SXT,MEM,NA,TPZ,LEV, CFT
24	01.01.21	80Y	F	*Citrobacter freundii.*	Ak,CN,MEM,NIT,F,TE	AMC,NET,ATM,FET,CFM,CAZ, CTX,CPZ,CIP,CT,SXT,IPM,NA,TPZ, DOX,LEV,CFT.
25	02.01.21	65Y	F	*E.coli*	AK,CN,NIT,TGC	AMC,NET,ATM,FEP,CFM,CAZ,CTX, CPZ,CIP,CT,SXT,IPM,MEM, NA,TPZ,DOX,TE,LEV,CFT.
26	02.01.21	42Y	F	*E.coli*	AK,AMC,CFM, CTX,CTZ,CIP,CO,CT,DOX,IPM,MEM,NIT,F, TP,TGC.	CN,NET,ATM,FEP,CAZ,SXT,NA,TPZ,TE,LEV,CFT.
27	02.01.21	40Y	F	*Klebsielle spp.*	AK,CFM, CAZ,CTX,CPZ,CT,CN,IPM,NIT,TP, TGC.	AMC,NET,ATM,FEP,CIP,SXT,MEM, NA,TPZ,DOX, TE,LEV,CFT.
28	01.02.21	37Y	F	*Enterobacter*	AK,MEM,CFM, CAZ,CTX,CPZ,CIP,CT,DOX,CN,LEV,NIT,TE, TGC.	AMC,NET,ATM,FEP,SXT,IPM,NA,TPZ,CFT.
29	01.02.21	68Y	M	*Pseudomonas spp.*	AK,CIP,CT,DOX,CN,IPM,MEM,NIT,F,TP, TE,TG	AMC,AK,NET,ATM,FEP,CFM,CAZ, CTX,CPZ, NA,TPZ,LEV,CFT.
30	02.02.21	31Y	F	*E.coli*	AK,CFM, CAZ,CTX,CTZ,CT,DOX,CN,IPM,MEM, NIT,F,TP,TE	AMC,NET,ATM,FEP,CPZ,CIP,SXT,NA,TPZ,TGC,LEV,CFT.
31	02.02.21	62Y	F	*E.coli*	AK,CT,DO,CN,IPM,MEM,NIT,F,TP,TE	AMC,NET,ETM,FEP,CFM,CAZ,CTX, CPZ,CIP,SXT,NA,TPZ,TGC, LEV,CFT.
32	02.02.21	71Y	F	*E.coli*	AK,CT,DOX,CN,IPM,MEM,NIT,TP,TE, TGC	AMC,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,SXT,NA,TPZ,TGC, LEV,CFT.
33	21.03.21	49Y	F	*S. aureus*	AK, CN,NET,LNZ,NIT,VA.	AMP,AMC,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,SXT,NA,TPZ,DOX, TE,CFT.
34	30.03.21	55Y	F	*E.coli*	AK,CN,NET, CIP,CT,IPM,MEM,NA,NIT,TPZ,TGC.	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,SXT,DOX,TE.
35	06.04-21	78Y	F	*Pseudomonas spp.*	AK,CN,NET,CIP,CT,IPM ,MEM,NIT,TPZ,TGC.	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,SXT, NA,DOX,TE.
36	08.04-21	80Y	M	*Pseudomonas spp.*	AK,CN,NET,CIP,CT,SXT,IPM,MEM,TPZ,TGC.	AMC,ATM,FEP,CFM,CAZ, CTX, CPZ,NA, NIT,DOX,TE.
37	12.04-21	57Y	F	*Pseudomonas spp.*	AK,CN,NET,CIP,CT,IPM,MEM,TPZ,TGC.	SXT,AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,NA, NIT,DOX,TE.
38	14.04-21	50Y	F	*Klebsiella spp.*	AK,CN,NET,CT,SXT,IPM,MEM,NIT,TPZ,TGC.	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,NA, DOX,TE.
39	19.04-21	32Y	F	*E.coli*	AK,CT,DOX,CN,NET,IPM,MEM,NIT,TPZ,TE, TGC	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP, SXT,NA.
40	20.04.21	24Y	F	*E.coli*	AK,CN,NET,CIP,IPM,MEM,NIT,TPZ,TGC.	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,CT,SXT,NA,DOX,TE.
41	21.04.21	45Y	F	*Klebsiella spp.*	CT, TGC.	AMC,AK,CN,NET,ATM,FEP,CFM,CA

						Z, CTX,CPZ,CIP,SXT,IPM,MEM, NA,NIT,TPZ,DOX,TE.
42	25.04.21	75Y	M	*Klebsiella spp.*	AK,CN,NET,CT,SXT,IPM ,MEM,NIT,TPZ,TGC	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,NA,DOX,TE.
43	30.04.21	50Y	F	*Pseudomonas spp.*	AK,CN,NET, CIP,CT,IPM,MEM,NIT,TPZ,TGC	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ, SXT,NA,DOX,TE.
44	01.05.21	93Y	M	*E.coli*	AK,CN,NET, CIP,CT,IPM,MEM,NIT,TPZ,TGC	AMC,ATM,FEP,CFM,CAZ, CTX,CPZ, SXT,NA,DOX,TE.
45	06.05.21	35Y	M	*Pseudomonas spp.*	CT	AMC,AK,CN,NET,ATM,FEP,CFM,CA Z, CTX,CPZ,CIP,SXT,IPM,MEM, NA,NIT,TPZ,DOX,TE,TGC
46	06.05.21	65Y	F	*Klebsiella spp*	CT,IPM,MEM,TGC,	AMC,AK,CN,NET,ATM,FEP,CFM,CA Z, CTX,CPZ,CIP,CT,SXT,IPM,MEM,NA, NIT,TPZ,DOX, TE,TGC.
47	08.05.21	24Y	F	*E.coli*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CT,SXT,IPM,MEM,NIT,TPZ, DOX,TE, TGC.	CIP,NA,
48	12.05.21	01Y	M	*Klebsiella spp*	AMC,AK,CN,NET,ATM,FEP,CFM,CAZ, CTX,CPZ,CIP,CT,SXT,IPM,MEM,NA,NI T,TPZ,DOX,TE,TGC.	NA
49	12.05.21	56Y	F	*Klebsiella spp.*	AK,CN,NET,CT,SXT,IPM ,MEM,NIT,TPZ,TGC,	AMC,AK,ATM,FEP,CFM,CAZ, CTX, CPZ,CIP,CT, SXT, IPM, MEM,NA,DOX, TE.
50	15.05.21	48Y	F	*E.coli*	AK,CN,NET,ATM,FEP,CTX,EPZ,CIP, CT,SXT,CT,IPM,MEM,NIT,TPZ,DOX,T GC,TE.	AMC, ATM, FEF, CFM, CAZ, CTX,CPZ,CIP,NA.

To control the overwhelmingly increased cases of antibiotic resistance, it is necessary to prescribe antibiotics in appropriate dosage only after antibiotic sensitivity test. At the same time, mass awareness should be improvised to make the general people informed about the deleterious effects of misuse of the antibiotics heading to the drug resistance which not only cause harm to the individual but also the people in surroundings (45).

Conclusion

Despite of being a common infectious disease, the successful treatment is becoming difficult due to multi drug resistant pathogenic bacteria. A very which is not enough. Development of alternate drugs is needed in urgent basis. At the same time, all the infected patients should be advised properly by the physicians to take the antibiotics strictly as per their suggestion only to minimize the condition of rapidly increasing antibiotic resistance.

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