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Prevalent Bacteria, Sensitivity and Resistance Pattern to Antibiotics Isolated from Routine Laboratory Specimens at Arafat Hospital in Garowe, Nugal Region of Eastern Somalia

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Keywords

Antibiotic,
Culture sensitivity,
Resistance

Abstract

Background and rationale: Human beings have been living unfriendly with a lot of microorganisms that can be a potential cause of infections and diseases. In the case of bacterial infections, due to the introduction of Penicillin for treatment in the early 1940s, there was an improvement. Majority of naturally derived antibiotics are produced from Actinomycetes. In this day, even though the struggle to defeat bacterial pathogens continues, bacteria are evolving ever cleverer by manifesting different forms of resistance. Antibiotics play an important role in the treatment of bacterial infections. However, several reports indicate an increasing rate of bacterial resistance. The resistance is mediated through cell membrane impermeability genetic transformation, mutation or the acquisition of plasmids, and the production of beta lactamases. Very often the resistance is mediated by a combination of these mechanisms. **Methods:** A retrospective review of different culture results performed in the period July, 2019 to February, 2020 at Arafat Hospital was made in March, 2020. The age and sex of patients, the organism isolated and the

antimicrobial susceptibility patterns were retrieved from the registration records using a standard data collection form. **Results:** *S. aureus* was 100% sensitive to Gentamycin, imipenem, meropenem, vancomycin, nitrofurantoin, linezolid and 100% resistant to ceftazidime and ceftriaxone. Also sensitive to doxycycline, tetracycline and azithromycin. In our study, CONS was 100% sensitive to Gentamycin,imipenem, ciprofloxacin, vancomycin, linezolid and resistant to penicillin and ceftazidime.Also sensitive to doxycycline, tetracycline and azithromycin. In our study, enterococcus was 100% sensitive to Gentamycin, imipenem, ciprofloxacin, vancomycin, linezolidand resistant to penicillin, doxycycline and azithromycin. In our study, S. pyogenes was 100% sensitive to Gentamycin, imipenem clindamycin, vancomycin, linezolidand resistant to ceftazidime and ceftriaxone. In our study, *E. coli* was 100% sensitive to imipenem, meropenem, Chloramphenicol, colistin, nitrofurantoin and 100% resistant to ceftazidime, ceftriaxone and penicillin. Ciprofloxacin, gentamycin tetracycline amoxiclav was 57.1%, 85.7%, 43%, and 15% respectively. In our study, Klebsiella was 100% sensitive to Imipenem,colistin,Chloramphenicol, and 100% resistant to ceftazidime, penicillin and cefoxitin. In our study, Proteus was 100% sensitive to amikacin, ciprofloxacin, imipenem, meropenem, netilmicin, Chloramphenicol and 100% resistant to doxycycline, tetracycline, and ceftazidime. In our study, Pseudomonas was 100% sensitive to Gentamycin, doxycycline, imipenem, amoxiclav, ciprofloxacin, chloramphenicol and 100% resistant to ceftazidime, ceftriaxone. **Conclusion**: More and more antibiotics are becoming ineffective due to emergence of resistance. Serious actions should be taken. Awareness should be raised from the policy maker level to the physicians and patients.

1. Introduction

Human beings have been living unfriendly with a lot of microorganisms that can be a potential cause of infections and diseases. In the case of bacterial infections, due to the introduction of Penicillin for treatment in the early 1940s, there was an improvement. Majority of naturally derived antibiotics are produced from Actinomycetes. In this day, even though the struggle to defeat bacterial pathogens continues, bacteria are evolving ever more clever by manifesting different forms of resistance(Reta, Bitew Kifilie and Mengist, 2019).

Antibiotics play an important role in the treatment of bacterial infections. However, several reports indicate an increasing rate of bacterial resistance. The resistance is mediated through cell membrane impermeability genetic transformation, mutation or the acquisition of plasmids, and the production of beta lactamases. Very often the resistance is mediated by a combination of these mechanisms (Med, 2002).

Antibiotic resistance is a global problem that has always been a major concern, but now it has probably become more pressing than ever before. Many factors are complexly related to the issue in multiple dimensions. There are many theories concerning the genesis of the phenomenon, including gross lack of awareness, inaction, excess use of antibiotics in the field of agriculture or aquaculture emergence of new mechanisms, etc.(Medicine, Hasan and Tasnim, 2017)

It was estimated in 1990 that 4,123 of the world's 5267 million population (78%) lived in developing countries. For the 39.5 million deaths in the developing world, 9.2 million were estimated to have been caused by infectious and parasitic disease. Infections of the lower respiratory tract were the third most common cause of death worldwide, and diarrheal diseases were the fourth. 98%of deaths in children occur in the developing world, mostly as a result of infections(Hart and Kariuki, 1998).

Though many opinions exist about how this danger, which is described as a global pandemic or a worldwide calamity, came into existence, it is not difficult to reach a universal consensus on the grave consequences that awaits the whole human race, caused by this single reason. Developing world is not exempted, rather more in the danger(Medicine, Hasan and Tasnim, 2017).

The current antimicrobial profile studies have been proved that; bacteria that can cause nosocomial as well as community acquired infections become pan resistant for different groups of antibiotics. Hence, this situation becomes a clinical threat to the human beings(Reta, Bitew Kifilie and Mengist, 2019).

Somalia is also right in the middle of this great calamity and is seeing the rise in resistant strains of several bacteria. It is noteworthy, that the causes of antibiotic resistance are often postulated to be its misuse and abuse. Somalia has become a major field of antibiotic misuse and abuse. However, there is much scarcity of medical literature in Somalia, on the antibiotic sensitivity pattern and prevalent microorganisms. Moreover, antibiotic sensitivity pattern changes over time and place, so it is an imperative, especially in today's age of antibiotic resistance, to continuously monitor and survey the prevalence of different microorganisms, antibiotic sensitivity pattern and resistance pattern.

2. Materials and Methods

2.1. Study Design and Setting: A retrospective review of different culture results performed in the period July, 2019 to February, 2020 at Arafat Hospital was made in March, 2020. The age and sex of patients, the organism isolated and the antimicrobial susceptibility patterns were retrieved from the registration records using a standard data collection form.

2.2. Study area: The study was conducted at Arafat Hospital which is teaching and research Hospital at Growe, the Capital of Puntland State of Somalia. The Hospital serves both inpatients and outpatients.

2.3. Method of urine specimen collection: Urine in the bladder of a healthy person is sterile, but it acquires organisms of the normal flora as it passes through the distal portion of the urethra. To avoid these organisms, a midstream specimen, voided after washing the external orifice, is used for urine cultures. In special situations, suprapubic aspiration or catheterization may be required to obtain a specimen. Because urine is a good culture medium, it is essential that the cultures be done within 1 hour after collection or stored in a refrigerator at 4°C for no more than 18 hours (Levinson, 2014). The urine was obtained from any patient presented with suggestive features of Pyelonephritis, Cystitis or suffering from pyrexia of unknown origin and dysuria or frequency. The collected urine specimen was inoculated on MacConkey's and CLED agar media using calibrated platinum loop following standard bacteriological technique and incubated at 37^{o}C for 24-48 hours. After 24 to 48 hours the plate was examined for bacteria. Pure bacterial colony counting 100,000 or more was considered as significant and was subjected to identification based on colony characteristics and biochemical tests.

2.4. Method of pus specimen collection: Aspirated material obtained from patients with abscess or localized collection of pus was sent to laboratory in suitable containers.

2.5. Method of wound swab specimen collection: Wound swab specimen was obtained from patients with infected wounds prior to any dressing or cleaning procedure of the wound. This allowed maximized material obtained and prevented killing of the organism by the use of antiseptics. A sterile swab was used and gently rotated on the area to collect exudate from the wound and then placed into transport medium. Where there was pus, it was collected as much as possible in a sterile syringe or sterile container and send to the laboratory.

2.6. Method of high vaginal swab specimen collection: The vaginal swab specimenwas obtained from anyfemale patients presented with abnormal discharge 2 or had history of contact with a partner with sexually transmitted diseases (STDs). The patient's labia were open apart with the help of speculum and swab was placed high inside the vaginal canal. The swab specimen was then taken off into the transport tube.

2.7. Method of semen specimen collection: In this study semen sample from patients was collected for routine culture and antibiotic susceptibility test and processed according to the standard laboratory methods. Semen was collected after 2-3 days of sexual abstinence in aseptic condition in clean dry, sterile and leak proof container. The sample was taken to the laboratory for further analysis without any delay. The sample collected was evaluated in terms of its acceptability, proper labeling (full name, age, serial number of the patient, date and time of collection). The semen samples were cultured onto the MacConkey agar and blood agar plates by the semi-quantitative culture technique using a standard calibrated loop. Known volume (0.001 ml) of mixed uncentrifuged semen was inoculated on the surface of MacConkey agar (MA) and blood agar (BA). The plates were then aerobically incubated at 370C 24 hours.(Tagurum YO, Okonoda KM, Miner CA, 2017).

2.8. Method of throat culture

2.8.1. Swab collection: The throat swabs were collected from patients who were admitted to Arafat Hospital in Garowe, Nugal Region of Eastern Somalia. The swabs taken from the tonsils and post pharyngeal were inoculated on blood agar plates and MacConkey agar plates. The plates were incubated at 37o C for 18 to 24 hours.(AL-Taei, Al-Khafaji and Al-Gazally, 2016).

2.8.2. Method of sputum culture: The sputum was obtained by any patient presented with suggestive features of pneumonia, tuberculosis or suffering from pyrexia of unknown origin and presented with productive cough. As it is important, it was ensured that the specimen for culture really be sputum, not saliva. Examination was done by a gram-stained smear of the specimen frequently reveals whether the specimen is satisfactory. A reliable specimen was more than 25 leukocytes and fewer than 10 epithelial cells per 100x field. An unreliable sample can be misleading and should be rejected by the laboratory(Levinson, 2014).

2.9. Method of antibiotic susceptibility testing: The isolates were tested for their sensitivity to various chemotherapeutic agents by disc diffusion method. The test was performed using Mueller Hinton agar (Hi– media) by employing 17antibioticdiffusion discs (Hi-media) viz. Ciprofloxacin (CIP, 5 mcg/disc), Gentamicin (GEN, 10 mcg/disc), Penicillin (P, 10 units/disc), Imipenem (IMP,10 units/disc), Levofloxacin (LE, 5 mcg/disc), Ceftriaxone (CRO, 30 mcg/disc), Cefotaxime (CTX, 30 mcg/disc), Cefoxitin (FOX, 30 mcg/disc), Azithromycin (AZM 15 mcg/disc, Nitrofurantoin 300 mcg/disc, Clindamycin(DA, 2 mcg/disc), Colistin 10(CL, mcg/disc), Doxycycline (DO, 30 mcg/disc) Linezolid (LZ,30 mcg/disc) Tetracycline(TE, 30 mcg/disc), Vancomycin (VA, 30 mcg/disc), Chloramphenicol (C,30 mcg/disc). Now, the zones of growth inhibition around each of the antibiotic discs are measured to the nearest millimeter. The diameter of the zone is related to the susceptibility of the isolate and to the diffusion rate of the drug through the agar medium (Prajapati *et al.*, 2012).

2.10. Statistical analysis: The data was edited, cleared and coded before analysis. Statistical analysis was done using SPSS (IBM Version 25) software. The results are presented as frequencies and percentages. Chi-square test was conducted to compare the proportion of bacterial isolates with patients' age and comparison of antimicrobial resistances. P-value of < 0.05 was considered to indicate statistically significant difference.

Results

Table I: The sex distribution of the patterns

Gender	Frequency	Percent
Male	28	40.0
Female	42	60.0
Total	70	100.0

The above table shows that most of the participants in this study were Female (60%) as compared to Male (40%).

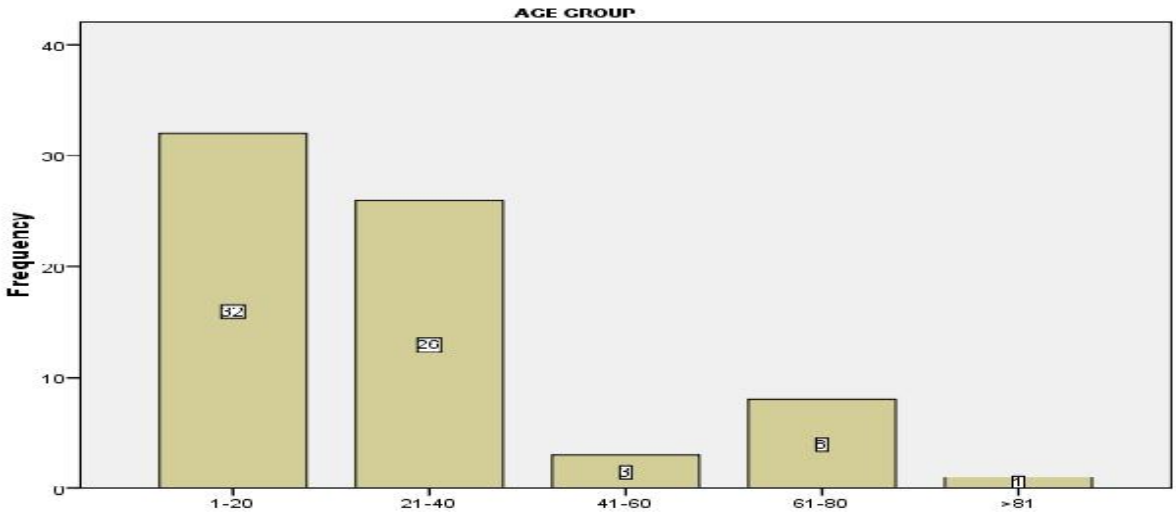

Figure 1: Distribution of the population according to the age group

Table II: proportion of samples in the study participants (n=70).

Sample Type		
	Frequency	Percent
Urine	27	38.6
Nasal Swab	1	1.4
Semen	1	1.4
Pus	14	20.0
Wound swab	6	8.6
Sputum	1	1.4
HVS(High Vaginal Swab)	5	7.1
Ear swab	9	12.9
Throat swab	4	5.7
Aspirate	2	2.9
Total	70	100.0

This table shows out of the 70 samples, 27 were urine (38.6%) most predominating followed by 14 (20%) were pus, (12 %) were Ear swab and throat swab 4(5.7 %).

Table III Different types of organisms, included in the study

Pathogens	Number	Percentage
Gram negative	28	40%
Klebsiella	14	20
E. coli	7	10
Pseudomonas	5	7,1
Acinetobacter	1	1.4
Proteus	1	1.4
Gram positive	42	60
Staph. aureus	20	28.6
CONS	12	17.1
St. pyogenes	8	11.4
Enterococcus	2	2.9
Total	70	100

The above table shows that Most of the microorganisms isolated were gram positive (60%) followed by gram negative (40%). In gram positive bacteria most predominating was *Staphylococcus aureus* followed by CONS. In gram negative bacteria most predominating was Klebsiella followed by *E. coli*.

Table IV: Sensitivity and resistant pattern of gram-positive bacteria

Organism	***S. aureus* N=20**		**CONSN=12**		***S. pyogenes* N=8**		**Enterococcus N=2**	
Antibiotic	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)
CAZ	0	100	0	100	0	100	0	100
AMC	60	40	41,6	58.3	-	-	0	100
CRO	0	100	0	100	0	100	0	100
AZM	25	75	33.3	66.7	75	25	0	100
CIP	85	15	100	0	87.5	12.5	100	0
DA	80	20	75	25	100	0	0	100
DO	50	50	50	50	50	50	0	100
CN	100	0	100	0	100	0	100	0
LZ	100	0	100	0	100	0	100	0
F	100	0	50	0	12.5	0	50	50
TE	55	45	41.7	58.3	50	50	-	-
P	0	100	25	75	25	75	50	50
VA	100	0	100	0	100	0	100	0
Imipenem	100	0	100	0	100	0	100	0

Key: CAZ=Ceftazidime,AMC=Amoxiclav,CRO=Ceftriaxone,AZM=Azithromycin,CIP=Ciprofloxacin, DA= Clindamycin, DO= Doxycycline, CN=Gentamycin, LZ=linezolid, F=Nitrofurantoin, TE=Tetracycline, P=Penicillin, VA=vancomycin and IMP=imipenem.

S. aureus was 100% sensitive to Gentamycin, imipenem, meropenem, vancomycin, nitrofurantoin, linezolid and 100% resistant to ceftazidime and ceftriaxone. Also sensitive to doxycycline, tetracycline and azithromycin.

In our study, CONS was 100% sensitive to Gentamycin, imipenem, ciprofloxacin, vancomycin, linezolid and resistant to penicillin and ceftazidime. Also sensitive to doxycycline, tetracycline and azithromycin.

In our study, Enterococcus was 100% sensitive to Gentamycin, imipenem, ciprofloxacin, vancomycin, linezolid and resistant to penicillin, doxycycline and azithromycin.

In our study, *S. pyogenes* was 100% sensitive to Gentamycin, imipenem clindamycin, vancomycin, linezolid and resistant to ceftazidime and ceftriaxone.

Table V: Sensitivity and resistant pattern of gram-negative bacteria.

Organism	Klebsiella sp. N=14		Acinetobacter N=1		Pseudomonas N=5		Proteus N=1		E.coli N=7	
Antibiotic	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S(%)	R(%)	S	R
CAZ	0	100	0	100	0	100	0	100	0	100
AMC	36	64	100	0	100	0	0	100	15	85.
CRO	0	100	100	0	0	100	0	100	0	100
CTX	0	100	0	100	0	100	0	100	0	100
IMP	100	0	100	0	100	0	100	0	100	0
CIP	46.2	53.8	100	0	100	0	100	0	57.1	42.9
FOX	0	100	0	100	0	100	0	100	0	100
CT	100	0	100	0	100	0	100	0	100	0
DO	43	57	0	100	100	0	0	100	43	57
CN	64.2	35.8	0	100	100	0	100	0	85.7	14.3
F	77	23	100	0	12.5	0	50	50	100	0
P	0	100	0	100	50	50	0	100	0	100
C	100	0	100	0	100	0	100	0	100	0

Key:CAZ=Ceftazidime, AMC=Amoxiclavs, CRO=Ceftriaxone, CTX=Cefotaxime, IMP=imipenem, CIP=Ciprofloxacin, FOX= Cefoxitin, CT=Colistin, DO= Doxycycline, CN=Gentamycin, F=Nitrofurantoin, P=Penicillin, C=Chloramphenicol.

In our study, *E. coli* was 100% sensitive toimipenem, meropenem, Chloramphenicol, colistin, nitrofurantoin and 100% resistant to ceftazidime, ceftriaxone and penicillin. Ciprofloxacin, gentamycin tetracycline amoxiclav was 57.1%, 85.7%, 43%, and 15% respectively.

In our study, Klebsiella was 100% sensitive to Imipenem, colistin, Chloramphenicol, and 100% resistant to ceftazidime,penicillin and cefoxitin.

In our study, Proteus was 100% sensitive to amikacin, ciprofloxacin, imipenem, meropenem, netilmicin, Chloramphenicol and 100% resistant to doxycycline, tetracycline, and ceftazidime.

In our study, Pseudomonas was 100% sensitive to Gentamycin, doxycycline, imipenem, amoxiclav, ciprofloxacin, chloramphenicol and 100% resistant to ceftazidime, ceftriaxone.

In our study, Acinetobacter was 100% sensitive to Gentamycin Ciprofloxacin, levofloxacin colistin, imipenem chloramphenicol, ceftriaxone, nitrofurantoinand resistant to ceftazidime, cefotaxime and penicillin.

Discussion

In the present study, gram-positive bacteria were the dominant isolates (60%) compared to gram-negative bacteria (40%). (Abera and Kibret, 2011) conducted a study that gram-negative bacteria were the dominant isolates (74.2%) of the discharging ears compared to gram- positive bacteria which is which contrasts with a study. Galhotra *et al.* shows that Gram positive organisms (65%) were predominant as compared with Gram negative organisms which is agreed to our study (Galhotra *et al.*, 2015).

In the present study, antimicrobial susceptibility of different Aerobic bacterial isolates was seen. In our study, Enterococci were 100% sensitive to Nitrofurantoin, Gentamycin, Linezolid and Vancomycin and 100% resistant to ceftazidime, ceftriaxone, and azithromycin. Ahmed et.al. conducted a study to see the aerobic bacterial pattern in puerperal sepsis and found that all the isolates of Enterococcus were sensitive to amoxicillin and ciprofloxacin(Ahmed *et al.*, 2008).

S. aureus was 100% sensitive to Gentamycin, Imipenem, Meropenem, Vancomycin, Nitrofurantoin, Linezolid and 100% resistant to Ceftazidime and Ceftriaxone. Khan et.al. conducted a study to see prevalence of multidrug resistant Staphylococcus aureus isolates in clinical specimens collected from local patients of Chittagong, Bangladesh, and found that the rate of resistance against ampicillin, Cephradine, Gentamicin and Ciprofloxacin were 92.1%, 60%, 58.1% and 59.35%, respectively (Ram *et al.*, 2000).

In this study, the susceptibility pattern of *S. aureus* isolates demonstrated 100% susceptible to ciprofloxacin and low level resistance to gentamicin, and ceftriaxone (Abera and Kibret, 2011).

Shahidullah et.al. found in a study to see the antibiotic sensitivity pattern of bacterial isolates from different clinical specimens at NICVD, Dhaka and found that *Staphylococcus aureus* was sensitive to only Imipenem and Cephalexin (Shahidullah *et al.*, 2012).

Sultanan et.al. conducted a study to see the current microbial isolates from wound swab and their susceptibility pattern in a private medical college hospital in Dhaka city and found that Staphylococcus aureus was sensitive to linezolid (94.38%), fusidic acid (91.01%), Vancomycin (87.64%), amikacin (74.15%) and gentamicin (73.03%). (Sultana *et al.*, 2015).

In our study, E. coli was 100% sensitive to Imipenem, meropenem, Chloramphenicol, Colistin, Nitrofurantoin and 100% resistant to ceftazidime, Ceftriaxone and Penicillin. Ciprofloxacin, gentamycin tetracycline amoxiclav was 57.1%, 85.7%, 43%, and 15% respectively. Kabir et.al. reported that enterotoxigenic E. coli were 100% sensitive to ceftriaxone, Nitrofurantoin, amikacin, 94% sensitive to Nalidixic acid, 89% sensitive to Gentamycin, 83% sensitive to Ciprofloxacin, 79% sensitive to Cephalexin, 39% sensitive to Amoxicillin, 46% sensitive to tetracycline and 31% sensitive to Cotrimoxazole (Kabir *et al.*, 2013).

The antibiotic susceptibility profile for all the UTI bacterial isolates in this study was Ciprofloxacin (54.4%), Nitrofurantoin (83.5%), ceftriaxone (50.6%), Cotrimoxazole (14%), Augmentin (16%), and Ampicillin (6.3%). Sensitivity to Nitrofurantoin was relatively high(Mohamed Hayir TM, Elmi and Suleiman, 2019).

In our study, Klebsiella was 100% sensitive to Imipenem, Colistin Chloramphenicol, and 100% resistant to Ceftazidime, Penicillin and Cefoxitin. Begum et.al. found in their study with neonatal sepsis patients, in NICU of BIRDEM, that Ampicillin and Gentamicin were 100% resistant

to Klebsiella third generation cephalosporin was also resistant to Klebsiella. Imipenem and meropenem were highly sensitive to all organisms(Begum *et al.*, 2012).

MDR *K. pneumoniae* strains were identified; similar antibiotic susceptibility pattern of K. pneumoniae isolates was also observed in wastewaters from the Democratic Republic of Congo (Obasi, Ugoji and Nwachukwu, 2019).

In our study, Proteus was 100% sensitive to amikacin, ciprofloxacin, Imipenem, meropenem, Netilmicin, Chloramphenicoland 100% resistant to doxycycline, tetracycline, and ceftazidime. Galhotra *et al.* conducted a study that Proteus Ceftazidime Netilmicin Gentamicin Cefuroxime and floxacillin 50%, 70%, 90%, 80% and 80% respectively(Galhotra *et al.*, 2015).

In our study, Pseudomonas was 100% sensitive to Gentamycin, Doxycline, Imipenem, Amoxiclav, ciprofloxacin, chloramphenicol and 100% resistant to ceftazidime, Ceftriaxone. This is in agreement with another study by Renuga *et al and* Abera and Kibret(Abera and Kibret, 2011;Renuga *et al.*, 2015).

In our study, Acinetobacter was 100% sensitive to Gentamycin Ciprofloxacin, levofloxacin Colistin, Imipenem, chloramphenicol, Ceftriaxone, nitrofurantoin and resistant to ceftazidime, Cefotaxime and Penicillin. Similar study done by Hasan and Tasnim that Acinetobacter was 100% sensitive to penicillin, cefuroxime, colistin, piperacillin+tazobactum combination, tigecycline, chloramphenicol and 100% resistant to cefixime, nalidixic acid. (Hasan and Tasnim, 2017).

In our study, CONS was 100% sensitive to Gentamycin, Imipenem, Ciprofloxacin, Vancomycin, and linezolid are resistant to penicillin and ceftazidime. This agrees with another study by Tayyar *et al* conducted that CoNS isolates showed high sensitivity to Vancomycin, linezolid, rifampin and nitrofurantoin. These four antibiotics may play an important role in the treatment and prevention of nosocomial infections of CoNS. However, CoNS species showed remarkable resistance to ampicillin, penicillin (Tayyar *et al.*, 2015).

In our study, enterococcus was 100% sensitive to Gentamycin, Imipenem, ciprofloxacin, Vancomycin, linezolidand resistant to penicillin and Azithromycin. Similar to the study of the resistance rate to Ampicillin was found to be 22.8% in enterococci isolates but different isolates expressing high-level resistance to Amikacin, Gentamicin, Kanamycin and Streptomycin were 22.8, 20.9, 19.9, and 19.4, respectively (Salem-Bekhit *et al.*, 2012).

In our study, *S. pyogenes* was 100% sensitive to Gentamycin, Imipenem, Clindamycin, Vancomycin, and Linezolidare resistant to Ceftazidime and Ceftriaxone. Prajapati *et al.* shows that out of 51 isolates, 100.0% isolates were sensitive to Penicillin and 94.1% to Ciprofloxacin. Sensitivity to chloramphenicol, Ofloxacin and Azithromycin was 92.1%, 88.2% and 84.3% respectively. 7.8% and 5.8% was found to be resistance to ampicillin and erythromycin respectively.(Prajapati *et al.*, 2012)

5. Recommendations

1. There is an extensive bacterial resistance to the major antibiotic which could be to abuse of antibiotic use and administration, therefore, drug regulatory body and policies should be put in place as soon as possible in order to reduce drugs abuse and importation of substandard drugs.
2. Culture and sensitivity should be used as it is gold-standard when it comes to management of bacterial infection, because, the empirical treatment will end up in failure in majority of patient treatment as seen in this research.
3. Further comprehensive sensitivity research is needed to understand better the resistance patterns existing in the country at large.
4. Culture capacity to be increased among the laboratory technologist operating in the country so the availability of culture providing center to be available to every physician working in the country.
5. National reference labs should perform antibiotics sensitivity testing, they should

also set standards operating procedure for other lab performs culture and sensitivity.

6. The finding of this study should be used a reference point, until further studies are done which are larger in terms of sample size.

Conclusions

1) More and more antibiotics are becoming ineffective due to emergence of resistance.
2) Serious actions should be taken.
3) Awareness should be raised from the policy maker level to the physicians and patients.

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