Antibiotic Sensitive And Resistant Proneness Of S.aureus In Pus And Blood Cultures

Ajay uniyal
Department of microbiology,
VCSGG Medical Science & Research Institute, Srinagar, Uttarakhand, India

Arun bhatt
Department of biotechnology,
GBPIET,Ghurdauri, Pauri, Uttarakhand, India

Y.P.Mathuria
Department of microbiology,
AIIMS, Rishikesh,Uttarakhand, India

Abstract - S.aureus is a usual member of microbiota of the body.In this study we will show the prevalence of antimicrobial susceptibily pattern of S.aureus in state of uttarakhand ,India. S.aureus is one the prominent cause for bacterial infections acquired from hospitals. Total of 500 samples were collected from the hospital of garhwal region and the susceptibility pattern was studied. The major section of the collected samples includes pus cells and blood samples. It was observed that males are more affecyed as compared to females. The study aims to find out the prevalence and resistant drug against the bacteria. Also we can establish a pattern of male is to female ratio for the same. Also the prevalence of MRSA and its antimicrobial susceptibity is also studied. Total of 146 samples showed multi-resistance to antimicrobial antibiotics. *S.aureus* isolates in this study represents comparatively higher resistance patterns against multiple drugs to some of the antimicrobials.

Keywords: Antimicrobial susceptibility; Bacterial infection; MRSA; Prevalence; S.aureus;

I. INTRODUCTION

The activity of antibiotic resistance is alarming and pharmaceutical and health industries are moving from traditional to newer patterns in terms of technologies to overcome with the problem. Infections caused by S.aureus are one of the most evident reasons of death rate and being unhealthy despite the advancement in antimicrobial agents. Among the staphylococcus species, S.aureus is the species having most severe and harmful effects and causes the disease maily originationg from hospitals and its a disease spreading due to community spread(P Francois et al,2003). The bacteria is mostly found in blood infections, skin infections, pneumonia and wounds often found post operation or surgery (H Kaur et al,2012).Healing of disease becomes a challenge with multi drug resistant strains which in turn is becoming a challenge for healthcare system.

It is found that MRSA strains are difficult to eradicate and spreads at a faster rate once introduces in hospitals (S Stefani ,2003). Proneness, however, varies from hospitals to hospitals, one place to another place. We will determine the susceptibility pattern and prevalence in pus cells and blood samples. MRSA is defined as zone of inhibition less than or equal to 21 mm on MHA with growth suspension of S. aureus isolates adjusted to 0.5 McFarland standards [12]. MDR is defined as non influenced and affected to at least one agent out of one or more antimicrobial classes [13].

II. Materials and Methods

For the purpose of study samples are collected from hnb base hospital. Samples may include post surgery wounds also. A total of 500 blood and pus samples were collected and sent for testing in the lab. The samples are handled carefully and are freed from pathogens.

2.1 Sample collection

Collected samples were put on Mac-Conkey and blood agar and were incubated at 37 ^{0}C to 38^{0}C for near about 48 hours. The morphological characterization will be observed by gram straining and microscopy based on color , size etc. gram strain procedure is used to identify the plates.

2.2 Biochemical characteristics

Coagulase test, catalase test, mannitol test urease test and dnase and phosphtase test are part of biochemical used for testing.

2.3 Kirby Bauer Disc Diffusion Method

The pattern of antibiotics influenced of MRSA strains was determined using Kirby Bauer disc diffusion method on Muller Hinton agar at the time of isolation. In 0.5 ml of medium growth suspension was made and turbidity was adjusted to match the fixed standards and protocols. Then a sterile swab was put into the into the suspension and the extra inoculum is extracted by pressing it against the sides of the tube followed by application of swab towards the centre of muller Hinton agar plate. Antibiotic discs were placed after 15 min of inoculation. The diameter of the zone of inhibition around the disc was measured using sliding metal caliper. The antibiotics those were used in the study includes penicillin(10mcg); erythromycin(15mcg); vancomycin(30mcg); cotromoxazole(25mcg); amikacin(30µg); cotromoxazole(25mcg); amoxyclave(30mcg); gentamicin(10mcg); ciphrofloxacin(5mcg); chloramphenicol(30mcg); rifampicin(5mcg); linezolid(30mcg) and many more.

III. RESULTS

The samples collected involves the patients of age from 1 day to 98 years of age It is observed that maximum number of patients infected to S.Aureus are in the age group of 25-31 years and males are more prone to infection as compared to females.

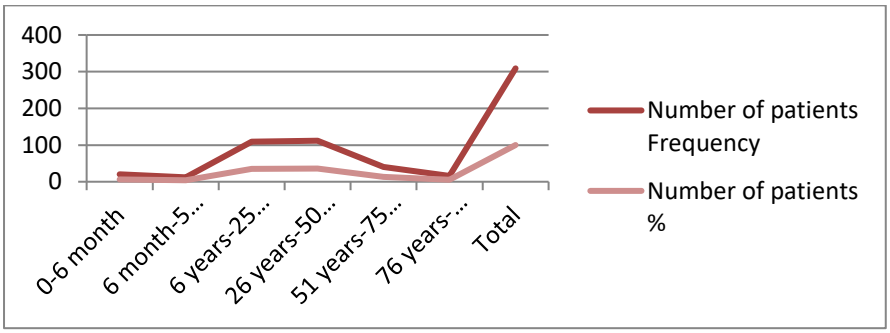

Fig 1:Graph representing age group distribution

The above figure represents the age distribution of samples.Total collected samples are 500 out of which around 310 are found to infected with S.Aureus. The study also represents how the different age groups are affected and what is the prevalence rate of S.aureus on varying age groups in a similar region. In the similar study ratio of male is to female is also observed to get the affected people status.

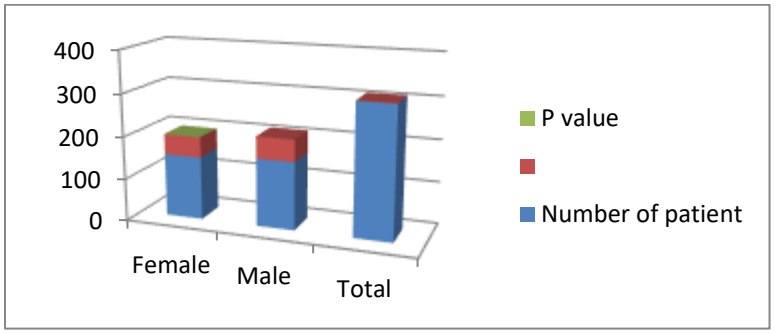

Fig2: Graph representing gender ratio

The above figure represents the gender ratio of S.aureus infected people. It is evident that males have a more probability to get infected as compared to female patients. We have collected the samples of pus and blood and following table represents the percentage of samples that were found to be infected with S.aureus. Pus cells in the study are having more percentage as compared to other samples. Blood samples include only 12% of S.aureus whereas pus aspirate includes 33% followed by pus samples which includes 54% of all samples.

Table 1.Sample Distribution

Sample based distribution		
Items	**Frequency**	**Percentage**
Blood	38	12
PUS	168	54
PUS aspirate	103	33

The overall prevalence of S.Aureus is found to be around 61% among total collected samples.

Prevalence of S.aureus

Out of 500 clinical samples collected S.aureus was isolated from around 310 samples. Males had more rate of isolation of around 60% as compared to 40%of females whereas isolation of S.aureus cannot bedirectly associated with gender. The age group includes 25-31 with higher rate of isolation of S.aureus.

Prevalence of MRSA

From 60%of isolates of S.aureus, around 31% were found out to be MRSA mostly connected with pus samples. It was studied that again cases of MRSA are dominant in case of males as compared to females. Most of the MRSA is found in age group of 25-40 years . the age group of 50 years and above comes after the age group of 25-40 years.MRSA was found least prevalent in the age group of 0-12 years.

Antimicrobial susceptibility pattern

The isolates of staphylococcus aureus are found very sensitive to amikacin and then to gentamycin. It is most resistant to penicillin followed by ciprofloxacin. The table can be seen to understand the pattern of sensitivity and resistance.Although it was found that all the MRSA about 95% are resistant to penicillin.
From this we can interprete which antibiotic is best and worst for S.aureus isolates and this in turn is a great achievement for medical professionals because S.aureus is becoming one of leading infections in the society and it is the high time to overcome this challenge.

The table below and the figure represents the detail description of antibiotic resistance and sensitivity pattern against S.aureus.
Figures are depicting a clear picture of how mu a particular antibiotic is sensitive or resistant against S.aureus. Observing the below table it is found that study to find prevalence of S.aureus is needs to be done at more fundamental level.

Table 2: Antibiotics sensitive and resistant %

Antibiotics	**Sensitivity (%)**	**Resistance (%)**
AMPICILLIN	14	17
AMOXICILLIN	39	41
AMIKACIN	87	5
CHILOROAMPHENICOL	72	5
COTRIMOXAZOLE	39.9	40
CEPHOXITIN/OXAC	22	5
CIPROFLOXACIN	50	31
ERYTHROMYCIN	48	25
GENTAMICIN	71	15
PENICIILIN	5	50
LINEZOLID	41	0
VANCOMYCIN	50	0

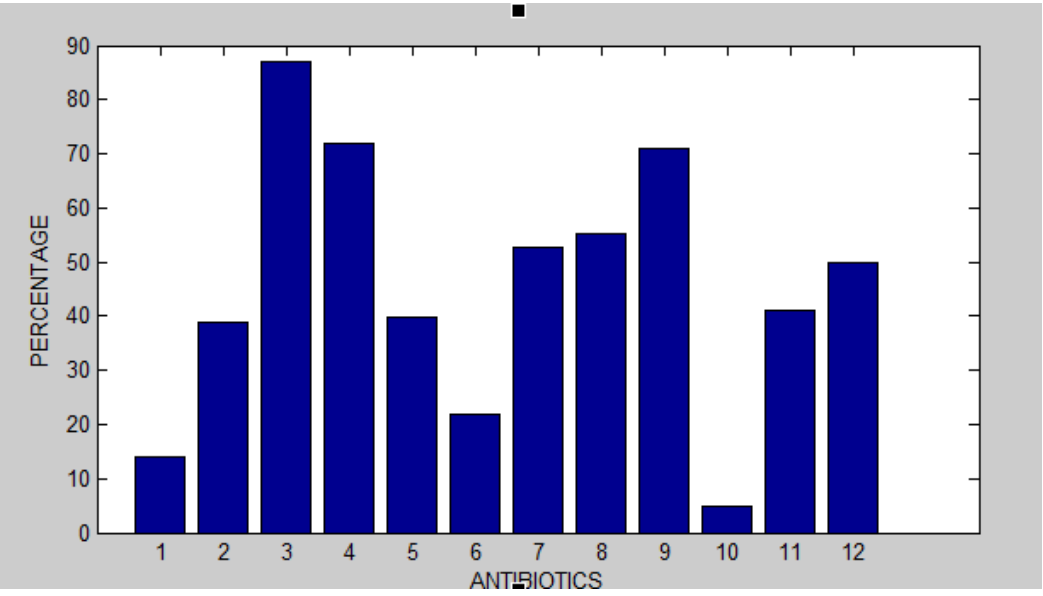

Fig3: Senstivity pattern against different antibiotics.

In above figure following are denotions used: 1:ampicilin; 2:amoxicillin; 3: amikacin; 4:chloramphenicol; 5:cotrimoxazole; 6:cephoxitin; 7:ciprofloxacin; 8:erythromycin; 9:gentamycin; 10:penicillin;11: linozoloid; 12:vancomycin.

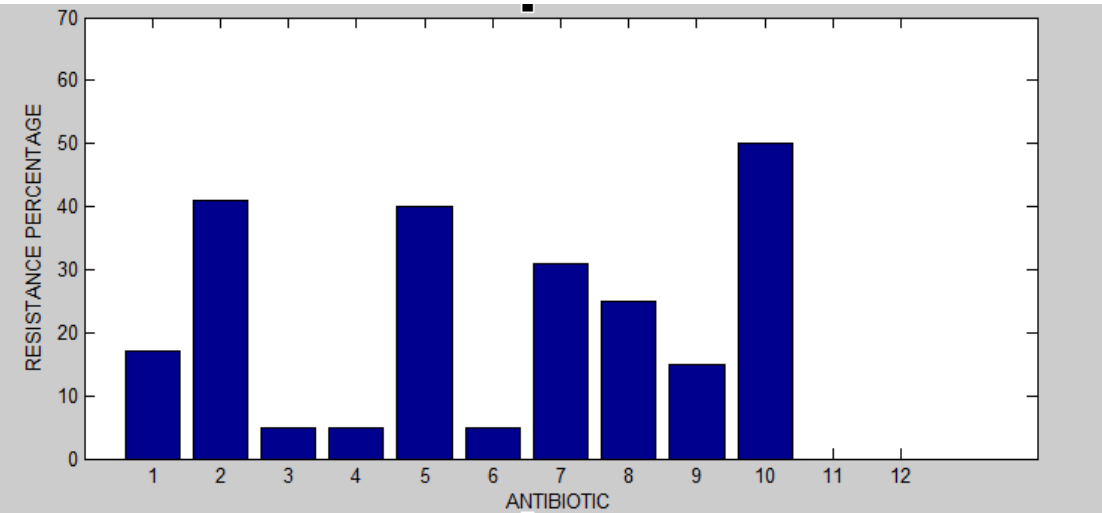

Fig4: Resistance pattern against different antibiotics.

IV. DISCUSSION

In our study it is found that males are dominate than females in which the isolates of S.aureus are found. Also the age group of 25-31 is most
sensitive against S.aureus isolates.Prevalence of MRSA is about 30% which lesser than the studies done before(geyid A). Prevalence of MRSA ranged from about 20 % in one country to over 60 % in other countries(orette A). It can be seen from our study that mostly the isolates are found in pus cells and the reasoncan be that samples also includes the wounds post surgery. MRSA is quite common at operation theatre sites or nearby critically illed people which may also include ICUs (choi CS). The sources of MRSA in hospitals/institutions are the people and patients who are infeted and the hands of staff workers can be reason for patient to patient transfer of infection(McDonald M).The MRSA isolates in a study by Onanugaet al. (2005) was found and studied to be susceptible to gentamicin and ciphrofloxacin. The findings in the study show moderate percentage of susceptibility to those of Akpaka et al. (2006) in Trinidad. Whereas MRSA was found to be highly susceptible to Ofloxacin in our findings.

V. CONCLUSION

The proneness of S.aureus and Multi resistant S.aureus is studied and mostly isolates are found in pus samples. It can be inference that MRSA are multi drug resistant. Also most of the isolates of S.aureus are resistant to vancomycin. Some more studies are needed to better understand the characterize the strains of S.aureus.

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