Prevalence and multidrug resistance of *Staphylococcus aureus* in the hospitals of Gulbarga and Raichur districts

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Abstract

A study to investigate the multidrug resistance of *Staphylococcus aureus* to conventional antibiotics being frequently used in these regions. Methicillin resistance *Staphylococcus* is pathogenic and is an important nosocomial organism. We report the prevalence and antimicrobial susceptibility pattern of MRSA is major in northern districts of Karnataka.   200 samples from variety hospitals in Gulbarga using standard microbiological techniques. 25 isolates are coagulase positive *Staphylococcus aureus*. Almost all isolates of MRSA 95% were resistant to amphicillin, 93.2% penicillin, 75% amoxicillin, 72% gentamycin, 70% erythromycin respectively; multidrug resistance was observed and suggests possible abuse of these drugs. Poor hospital attendance and the need for better enlightment campaign against the use of drug without prescriptions.

Keywords: *Staphylococcus aureus*, methicillin, multidrug resistance, clinical samples, antibiotics sensitivity, beta lactamase test.

INTRODUCTION

Staphylococcus aureus causes a variety of suppurative (pus – forming) infections and toxinoses in humans, though also a commensal of human skin and nares. It causes boils, styes, furunculoseis and systematic meningitis, urinary tract infections, myelitiy and endocarditis. Bloodstream, lower respiratory tract [1]. Staphylococcal infection leads to a worsening of some already existing superficial infections and that antibacterial treatment is beneficial when children have cases of impetigo.Infections range from such superficial infection to deep infection as septicemia, making *Staphylococcus aureus* an important subject of consistent studies[2].

Staphylococcus aureus is a major cause of hospital acquired (nosocomial) infection of surgical wounds and infections associated with indwelling medical devices. Infection rate from *S. aureus* is high the recent increased recognition of community acquired infections has important clinical and pharmacological implications for the health care provider.   Urgent control measures should be taken to combat the renowned aetiology of both nosocomial and community acquired infections.   In recent years, many isolates of *Staphylococcus aureus* have evolved resistance to both synthesis and traditional antimicrobial chemotherapy and their prevalence outside the hospital is of potential epidemiological treat [3,4].

The study on epidemiological studies on multidrug resistance strains of *S. aureus* as hospital acquired infection in these districts was undertaking the all aspects of Staph. Infection as mention above. Antibiotic resistance is a direct consequence of antibiotic use.   Both continue to isolate despite many cells for moderation of antibiotic use.

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Much has been written on antibiotic policies and others control measures. Despite the lack of properly controlled studies, which would be very difficult to perform, there is no doubt that polices can be efficacious in reducing costs and levels of use without being detrimental to patient care. However, may barriers and each institution will need to adapt these measures to their own needs. Timely information and education are crucial and efforts certainly need to be continuous to maintain effect.

The study on prevalence and multidrug resistance of *S. aureus* in the local general hospital environment and laboratory samples were undertaken keeping in view all the aspects of hospital acquired infections as mentioned above.

MATERIALS AND METHODS
Sample collection

Collection from the different labs of Gulbarga and Raichur districts weekly once. The samples from the patient's swabs from pus, wound infections, and then swabs are directly put into the sterile test tubes containing nutrient broth to prevent drying of swabs. Then inoculated on the plates containing different media namely nutrient agar, mannitol salt agar and were incubated at 37°C for about 24 hrs. The organisms on the positive plates indicates golden yellow coloured colonies on nutrient agar and yellow coloured colonies on mannitol salt agar media, then were gram staining catalase test and coagulase test were carried out on the gram positive cocci in cluster. The organism was characterized using the criteria of Cowan and Steel [5].

Antimicrobial susceptibility pattern

Totally all isolates are subjected to test antimicrobial susceptibility test.   Our objective to study resistance to the commonly used conventional antibiotics in these areas. Penicillin, ampicillin, amoxicillin, gentamycin, tetracycline, erythromycin, methicillin and vancomycin the disc diffusion method for in vitro antibiotics susceptibility test Kirby – Bauer[6] was used in the study.

Beta lactamase test

Based on the resistance of the *Staphylococcus aureus* isolates to penicillin and others beta lactam antibiotics used, beta lactamase test was carried out using the method of Odugbemi et a,.[7]. Strips of starch paper about 4.7 cm were cut and sterilized using 70% ethanol, the strips were soaked for 10 min. in benzyl penicillin dissolved in phosphate buffer with 100,000 units. The cut strips were then spread evenly on petri dishes and about 18-24 hrs old cultures grown on nutrient agar were inoculated on the surface of the test paper and spread over an area 2-3 mm. The petri dishes were incubated at 37⁰C for 30 min then Gram's iodine solution was used to flood the plate and drained off immediately. The starch paper turns uniformly black within 30 sec. of application colonies with decolorized zones are positive for beta–lactamase but colonies with black background show beta lactamase negative. The result was read within 5 min because of the time extended further the black background indicative of negative will start decolorizing thus giving a false positive result.

RESULTS

A total of 200 clinical samples were collected for the study from different hospitals and laboratories of Gulbarga and Raichur districts.60 of *Staphylococcus aureus* they show coagulase, catalase positive. Maximum of 20 samples were obtained from the age group (11-20 years) followed by the age groups 31-40 years, (18 samples). From the age groups of 1-10, 41-50 and 51-60 years (Table 1). Four and five samples were obtained respectively.

Table 1. Age distribution of clinical sample

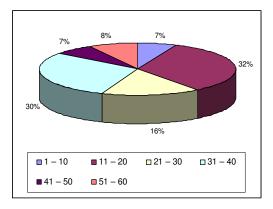| Age range	No. of patients	Percentage
1 – 10	4	6.6%
11 – 20	20	33.3%
21 – 30	10	16.6%
31 – 40	18	30%
41 – 50	04	6.6%
51 – 60	05	8.3%

Fig1.Prevalence of methicillin resistant *Staphylococcus aureus* (MRSA) among different age groups of samples
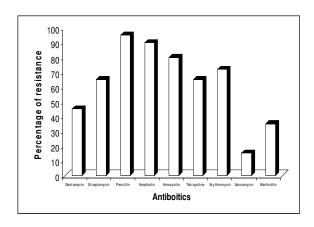

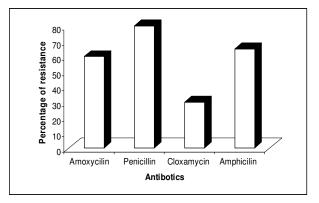Fig 2. Multidrug resistance of MRSA isolated from clinical specimens

Fig 3.Percentage of the isolates to the β-lactam antibiotics

The multidrug resistance pattern of methicillin resistance *Staphylococcus aureus* isolated from clinical specimens. Samples were found to be high resistance variable. All the MRSA strains (96.0%) screened from clinical specimens were resistant(Fig.2) to penicillin, ampicillin 90%, amoxicillin 85%, gentamycin 55%, streptomycin 65%, tetracycline 64%, erythromycin 72%, methicillin 19%, and vancomycin 25%. However, MRSA strains are sensitivity to vancomycin & 25% high percentage of intermediate resistance was recorded against erythromycin, streptomycin and ciprofloxacin. Based on the resistance pattern of the isolates against the β-lactam antibiotics (Fig.3), 8 of the 12 isolates tested for β-lactamase were the for the production of the enzymes.

DISCUSSION

Staphylococcus aureus is a major noscominal pathogen causing significant morbidity and mortality [8]. The important reservoirs of MRSA in hospitals are infected or colonised patients and transient carriage and hands of health care workers is the predominant mode for patient to patient transmission.

8 often 12 isolates that produced beta lactamase were resistant to all the β-lactam antibiotics used in this studies. This revealed that the resistance is purely plasmid based since β-lactamase production is plasmid based. This contributes a lot to the level of multiple drug resistance as about 88% of the isolates show resistance to more than five antibiotics. The resistance however might suggest the role of *mecA* gene in the isolates [9].

The upsurge in the antibiotic resistance noticed in this study is in agreement with an earlier report. Where antibiotic abuse and high prevalence of self medication with antibiotics were identified as being

responsible for the selection of antibiotic resistant bacterial strains.

Prevention of MRSA infection in patients should be an achievable goal by taking appropriate control measures. It can be considered that in the present study the prevalence of MRSA is very high, the patients in the present study have to be handled carefully and there is every possibility for the spread of MRSA by the carriers. Hence, it is suggested that the measures to control MRSA is an immediate need.

The idea of vaccine against Staphylococcal infection would be a welcomed available for abuse. It is time to embrace the use of local plant extract with proven therapeutic and prophylactic potency [10, 11, 12].

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REFERENCES

[1]Lowry FD.1998, Staphylococcus aureus infection. *New Engl.J Med* 339: 520-532.

[2]Komoloafe AO Aegoke AA. 2008, Incidence of bacterial septicaemia in Ile-life Nigeria.*Malasian J.Microbial* 4(2):51-61.

[3]Daum RS, Seal JB. 2001. Evolving antimicrobial chemotherapy for staphylococcus aureus infection; our backs to the wall critical care med.29 (4;Suppl)92-96.

[4]Kalpan SL Hulten KG, Ganzalez BE, Hammerman WA, Lamberth L,Varsalovic J, Mason EQJ. 2003.treatment of staphylococcus aureus bactermia in children.*Clin.Infect.Dis* 40;1785-1791.

[5]Cowan ST, Steel KJ. 2004, In manual for identification of medical bacteria 3rd edition Cambridge University Press pp.50-140.

[6]Kirby-Bauer, J.C.Sherris&M.Turcle.1996, Antibiotic sensitivity testing by a standard single disk method. *American Journal of clinical Pathology,*45:493 -496.

[7]Odygbemi TO, Hafiz S,Me Entegart MG.1997.Penicillinase producing Neissaria gonorrhoeae; Detection by starch paper technique. *British Med.J.*Z.500.

[8]Sachdev D,Amladis Nataraj G,Bavejas,Kharkar V,Maharajan S *et al.* 2003.An example of Methicillin resistant staph.aureus(MRSA) infection in dermatology indaar patients. *Indian J dermatol Venereal Leprol* ;69:377-380.

[9]Murakami K,Minamide W,Methicillin resistance strains of staphylococci by polymerase chain reaction.J Clin Microbial Screening of herbal remedies on akwa Iborn state, south southern *Nigeria.J Med Plants Res,*21 (11):306-310.

[10] Adebayo-tayo BC, Adegoke AA. 2008.Phytochemical and microbial screening of herbal remedies in Awka Ibom State. *South southern Nigeria J.Plants Res.*21 (11):306310.

[11] Adegoke AA,Adebayo tayoBc. 2009.Antibacterial activity and photochemical analysis of leaf extracts lasienthara Africanum.*African Journal of Biotech,*8(13):77-80.

[12] Oldae JK, Kolawae DO, Erhum WO.1988.the antibacterial and antifungal activities of certain compounds of Aframanium meleganeta, *Rosoe fnitis Fitotuape* 383-389.