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RIFAMPICIN FOR ERADICATION OF STAPHYLOCOCCUS AUREUS ORAL CARRIAGE FROM HEALTHY GENERAL POPULATION & HEALTHCARE WORKERS

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ABSTRACT
Rifampicin has been used for the eradication of *Staphylococcus aureus* oral colonization in various populations of healthy population. The oral cavity carriage and antibiotic susceptibility patterns of *Staphylococcus aureus* in Dental hospital staff and healthy general population were determined. Oral cavity swabs were taken from 113 healthy general population and 90 health care workers. The in-vitro antimicrobial activity of rifampicin was carried out by Disc Diffusion Method (Kirby-Bauer test). *Staphylococcus aureus* carriage was noted in 28.3% of healthy general population and 38.9% of health care workers. Out of the 32 strains isolated from the healthy general population, a percentage of these strains were sensitive to rifampicin (93.7%) and out of the 35 strains isolated from the health care workers, a percentage of the strains were also sensitive to rifampicin (91.4%). The available evidence suggests that oral rifampicin is an effective agent for the eradication of *Staph. aureus* carriage.

KEY WORDS: *Staphylococcus aureus*, oral carriage, healthy general population & healthcare workers, rifampicin.

INTRODUCTION

Antimicrobial resistance (AMR) is a global growing issue and several reports suggest that it is an increasing problem of phenomenal proportions, affecting both developed and developing countries [Sharma et al.; 2005]. AMR is considered as a natural phenomenon for the survival of micro-organism. Therefore, it is imperative to slow the rate of development of AMR to a level that maintains the usefulness of the antimicrobials [Sharma et al.; 2005]. Accurate determination of bacterial susceptibility to antibiotics is essential for the successful management of bacterial infections and comparative analysis of antimicrobial agents. Public health officials and clinicians monitor drug resistance through appropriate reporting of the results from susceptibility tests and this can be achieved using a number of techniques, including the disk diffusion method, the broth dilution assay, and the E tests [Bonev et al.; 2008]. As antibiotic resistance reduces treatment efficacy, it is a time to consider routine susceptibility testing to guide individual patient treatment and surveillance of antibiotic resistance [Nweneka et al.; 2009].

Rifampicin was introduced in 1967[Long, James W.; 1991]. Rifampicin is typically used to treat *Mycobacterium* infections, including tuberculosis and Hansen's disease. It can be used to treat BCG-oma, which follows as an uncommon complication of BCG vaccination for tuberculosis. With multidrug therapy used as the standard treatment of Hansen's disease, rifampicin is always used in combination with dapsone and clofazimine to avoid eliciting drug resistance.

Rifampicin is used in the treatment of methicillin-resistant *Staphylococcus aureus* (MRSA) in combination with fusidic acid, including in difficult to treat infections such as osteomyelitis and prosthetic joint infections [Aboltins et al., 2007].

Reduced susceptibility to common use of antibiotics has become a major problem. This study aims to determine the present trends of antimicrobial sensitive to rifampicin by *Staph. aureus* isolated from oral cavity. In-vitro disk diffusion method was used to evaluate the growth of inhibition of this pathogen, since Bauer-Kirby disk diffusion technique is a simple, reliable, and reproducible way to assess the antimicrobial susceptibilities [Kiehlbauch *et al*., 2000].

METHODS

This was prospective study conducted during 12 months from March, 2011 to February 2012.

Study setting

The study was conducted in Gurunanak Institute of Dental Science and Research; Panihati, North 24 Parganas, Kolkata-700114, West Bengal, India.

Collection and processing of samples

Oral cavity swabs are collected from Health care workers (HCWs) and General populations with no oral complaints, using sterile swab sticks. Oral cavity swabs were taken from 113 healthy general population and 90 hospital personnel had no definite oral or dental complaints.

The samples were cultured aerobically in Mannitol salt agar media (Himedia Laboratories Pvt. Ltd.; Mumbai). The plates were incubated aerobically at 37°C for 24 hrs.

Streak plate technique was used to obtain pure culture of each isolate prior to identification.

IDENTIFICATION OF ISOLATES

The isolates were identified using colony morphology with Mannitol fermentation by colour change of the medium around each colony from red to yellow (used of Mannitol salt agar), Gram staining, Catalase, Coagulase test (slide & tube method) and DNase test as described by Cheesbrough; 2002.

Two hours Tryptone Soya Broth (Himedia, Mumbai) (3ml) cultures at 37°C of each isolate were adjusted to McFarland turbidity (0.5), and the disc sensitivity screening conducted as described by Cheesbrough; 2002. Sensitivity testing using Kirby-Bauer disc diffusion technique [Bauer et al. (1966)]. Sterile swabs were used to inoculate the test organism onto the sensitivity agar (Mueller Hinton agar media) (Himedia, Mumbai). Plate was dried for five minutes. Using sterile forceps, place disks of rifampicin (05 mcg) (Himedia, Mumbai) on the plate. Plate was incubated within 15 minutes after applying the disk at 37°C for 18 hours. The diameter of the zones of growth inhibition around disk was measured to the standard values provided by CLSI this pathogen was classified as sensitive (20 mm) and resistant (16 mm) [CLSI; 2007]. The result value ranges are usually regarded as pinpointing of non useful curative option akin to the resistant category for treatment purpose [Schwalbe et al.; 2007]. American Typing Collection (ATCC 25923) of *Staph. aureus* was used as a control strain in antibacterial susceptibility testing.

RESULTS

A total of 35 of 90 (38.9%) health care workers were *Staphylococcus aureus* carriers compared to 32 of 113 (28.3%) of the healthy general population. Antibiotic disc susceptibility testing was carried out on all the 67 *Staphylococcus aureus* isolates. The strains isolated from two sites from the same subject if the strains exhibited the same antibiotic susceptibility pattern. Out of the 32 strains isolated from the healthy general population, a percentage of these strains were sensitive to rifampicin (93.7%) and out of the 35 strains isolated from the health care workers, a percentage of the strains were also sensitive to rifampicin (91.4%).

DISCUSSION

Antibiotic resistance is one of the world's most pressing public health problems. The antibiotic resistant organisms can quickly spread and so threaten communities with new strains of infectious disease that are more difficult to cure and more expensive to treat. Treatment failures may arise due to the resistance offered by pathogen against effective broad spectrum antibiotics. These treatment failures and hard to treat infections may results in high death rates [Khushal; 2004].

In this study rifampicin is still considered as a better choice against *Staph. aureus.* In this study rifampicin sensitive to high rate. This high rate of sensitivity may be because rifampicin is not in common use and is normally used in the treatment of tuberculosis caused by *Mycobacterium tuberculosis.*

In conclusion, the available evidence suggests that oral rifampicin is an effective agent for the eradication of *Staph. aureus* carriage.

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REFERENCES

Aboltins, C. A., Page, M.A., Buising, K.L. (2007) "Treatment of staphylococcal prosthetic joint infections with debridement, prosthesis retention and oral rifampicin and fusidic acid". *Clinical Microbiology and Infection* **13** (6): 586-591.

Bauer, A.W., Kirby, W.M., Sherris, J.C., Turck, M. (1966) Antibiotic susceptibility testing by a standardized single disk method. Am. J. Clin. Pathol. **45**(4): 493-496.

Bonev, B., Hooper, J., Parisot, J. (2008) Principles of assessing bacterial susceptibility to antibiotics using the agar diffusion method. J Antimicrob Chemother. **61**(6): 1295-1301.

Cheesbrough, M. (2002) District Laboratory Practice in Tropical countries. Part-2. Cambridge University Press; Chapter-7, 135-162.

CLSI (2007) Performance standard for antimicrobial susceptibility testing. CLSI approved standard M100-S17. Clinical and Laboratory Standards Institute. Wayne,PA.

Kiehlbauch, J.A., Hannett, G.E., Salfinger, M., Archinal, W., Monserrat, C., Carlyn, C. (2000) Use of the National Committee for Clinical Laboratory Standards guidelines for disk diffusion susceptibility testing in New York state laboratories. J Clin Microbiol. **38** (9): 3341-3348.

Khushal, R. (2004) Prevalence, characterization and development of resistance pattern in indigenous clinical isolates against cephalosporins. Ph. D Thesis. Department of Biological Sciences/ Quaid-i-Azam University, Islambad, Pakistan, pp. 1-10.

Long, James, W. (1991) *Essential Guide to Prescription Drugs 1992*. New York: Harper Collins Publishers. pp. 925–929.

Nweneka, C.V., Tapha-Sosseh, N., Sosa, A. (2009) Curbing the menace of antimicrobial resistance in developing countries. Harm Reduct J. **6:** 31.

Sharma, R., Sharma, C.L., Kapoor, B. (2005) Antibacterial resistance: current problems and possible solutions. Indian J Med Sci. **59** (3): 120-129.