



## ANTIBIOGRAM PROFILE OF STREPTOCOCCUS MUTANS ISOLATED FROM THE PATIENTS WITH DENTAL CARIES

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### ARTICLE INFO

#### Article History:

Received 20<sup>th</sup> August, 2017

Received in revised form 29<sup>th</sup>

September, 2017

Accepted 30<sup>th</sup> October, 2017

Published online 28<sup>th</sup> November, 2017

### ABSTRACT

**Background:** Dental caries is recognized as one of the most infectious diseases worldwide. Streptococcus mutans have been commonly associated as major cariogenic bacteria. This study was conducted to study the antibiotics resistance to streptococcus mutans isolated from dental caries.

**Aim and objective:** The aim of the study is to find the antibiogram profile of streptococcus mutans isolated from the patients with periodontitis.

**Materials and methods:** Sample was collected from the patients with dental caries. Antibiogram of S. mutans were followed by Kirby-Bauer disc diffusion method. The isolates were inoculated in BH1 broth for 6 hours and lawn culture of this was made in Mueller Hinton agar with a sterile cotton swab. The plates were dried and antibiotics were placed (Penicillin, ceftriaxone, chloramphenicol, tetracyclin, ampicillin, clindamycin, erythromycin, gentamycin, vancomycin, amoxicillin) were incubated at 37C overnight.

**Result:** Out of the isolates 100% sensitivity was seen in amoxicillin, vancomycin and clindamycin 90% with gentamycin and ampicillin and 80% with erythromycin

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### INTRODUCTION

Dental caries is recognized as one of the most infectious diseases worldwide). Mutans streptococci (MS) have been commonly associated as major cariogenic bacteria. Streptococcus mutans is emphatically connected with human dental caries. S. mutans is present in oral flora and has been demonstrated to be a causative specialist for dental caries because of its capacity to metabolize fermentable carbohydrate into organic acids. These acids can cause a fall in pH, which can lead to an increase of enamel solubility that is dental caries(1). Streptococcus mutans is a Gram-positive, non-motile, non-spore forming, catalase-negative, facultative anaerobic cocci bacterium commonly found in the human oral cavity, is a significant contributor to tooth decay(2) Although Streptococcus mutans (S. mutans) is established as the key pathogen responsible for dental caries; other species by their ability to produce acids can also be implicated in the disease (3). The viridans streptococcus group also causes odontogenic infections(4).

All Streptococcus mutans serotypes such as Streptococcus sobrinus (serotypes d, g and h) have been shown to have significant potential to cause caries, but because of their

significant genetic and biochemical differences, they should not be referred as simply as the single species S. mutans. S. mutans and lactobacilli are acidogenic and acid uric bacteria and seem to be the primary organisms associated with caries in humans.(6) Increasing hospital and community-acquired infections due to bacterial multidrug-resistant (MDR) pathogens for which current antibiotic therapies are not effective represent a growing problem. Antimicrobial resistance is, thus, one of the major threat to human health.(16) The emergence of resistance against newly developed antibiotics further supports the need for innovation, monitoring of antibiotic consumption, prevention, diagnosis and rapid reduction in the misuse of these drugs. It is thus necessary to optimize antibiotics' pharmacokinetics and pharmacodynamics in order to improve treatment outcomes and reduce the toxicity and the risk of developing resistance. The antibiotics used in this study are Penicillin, ceftriaxone, chloramphenicol, tetracyclin, ampicillin, clindamycin, erythromycin, gentamycin, vancomycin, amoxicillin.

### MATERIALS AND METHODS

#### Tooth Decay Sample Collection

Samples (decayed tooth) were collected from the patients with dental caries. Samples were collected in sterile containers labeled with patient name, age and collection date. Samples

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were kept and transported to the laboratory with ice box and all the collected samples were incubated at 37 oC for 24 h.

**Isolation of Streptococcus mutans**

Mitis-Salivarius agar was used for isolation of Streptococcus mutans. The agar plates were inoculated with each of the sample by spreading 0.1 ml of a suspension.

**Antibiotic susceptibility test**

Antibiogram of S.mutans were followed by kirby-Bauer disc diffusion method. The isolates were inoculated in BHI broth for 6 hours and lawn culture of this was made in Mueller Hinton agar with a sterile cotton swab. The plates were dried and antibiotics were placed (Penicilin, ceftriaxone, chloramphenicol, tetracyclin, ampicillin, clindamycin, erythromycin, gentamycin, vancomycin, amoxicilli) were incubated at 37C overnight.

**RESULTS AND DISCUSSION**

Out of the isolates 100% sensitivity was seen in amoxicillin, vancomycin and clindamycin 90% with gentamycin and ampicillin and 80% with erythromycin. Penicillin G administered parenterally or administered orally are currently the antibiotics of choice for treatment of dental infections of usual etiology. Infections caused by penicillinase-producing staphylococci or those involving gram-negative bacteria should be treated with a penicillinase-resistant penicillin or an ampicillin-like derivative, respectively.

S. No	Antibiotics	Disc potency (µg/disc)	Resistance <mm(R)	Sensitivity (S)
01	Penicillin-G	2units	30%	70%
02	Ceftriaxone	30mcg	40%	60%
03	Chloramphenicol	30mcg	40%	60%
04	Tetracycline	10mcg	50%	50%
05	Ampicillin	10mcg	-	100%
06	Clindamycin	10mcg	10%	90%
07	Erythromycin	15mcg	20%	80%
08	Gentamycin	10mcg	10%	90%
09	Vancomycin	10mcg	-	100%
10	Amoxicillin	10mcg	-	100%

Erythromycin is a second-choice bacteriostatic antibiotic, becoming first choice for treating dental infections in patients allergic to penicillin. The cephalosporins, similar in action to ampicillin-like penicillin derivatives, may be used with caution in patients who have exhibited delayed-type allergic reactions to penicillin and when erythromycin cannot be used. Clindamycin administered orally administered parenterally are reserve antibiotics indicated for treatment of bone infections and/or anaerobic infections refractory to commonly used antibiotics. Tetracyclines are, at best, third-choice agents for usual dental infections. However, they are useful for cases of acute necrotizing ulcerative gingivitis requiring systemic antibiotic therapy when penicillin is precluded. Vancomycin

are used prophylactically for prevention of infective endocarditis in patients with prosthetic heart valves.

**CONCLUSION**

The paper is aimed towards the evaluation of current efficacy of commercially available drugs in India against three strains of S. mutans which is primarily responsible for causing dental caries and for also determining which drug should be prescribed by the dentists that exhibits minimal side effects and maximum inhibitory activity. In the recent years, a shift from narrow- spectrum antibiotic prescriptions which included penicillin to broad-spectrum aminopenicillins which include amoxicillin by dental professionals has been reported and the increase of bacterial isolates resistant to the former antibiotics is blamed for such a shift in prescription practices

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**How to cite this article:**

Keerthana R and Gheetha (2017) 'Antibiogram Profile of Streptococcus Mutans Isolated from the Patients with Dental Caries', *International Journal of Current Advanced Research*, 06(11), pp. 7194-7196.  
DOI: <http://dx.doi.org/10.24327/ijcar.2017.7196.1098>

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