

In the name of God

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Prevalence and Susceptibility Pattern of Bacterial Isolates of Dental Caries in a Secondary Health Care Institution, Nigeria.

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Abstract:

Introduction: The mouth is a favourable habitat for a great variety of bacteria due to the presence of nutrient, epithelia debris and secretions

Aim: The aim of this study is to screen for the incidence of Microorganisms from cases of dental caries in Minna General Hospital and to test antibiotic resistance profile of the pathogens.

Method: The samples used were obtained from 40 patients attending the Dental Unit of General Hospital Minna. In order to ensure uniform specimen collection from the oral cavity of the patients, only the investigator swabbed the patients using sterile cotton swab sticks. Specimen was taking from the carious tooth of each patient.

Result: Bacteria isolated were identified as strains of Streptococcus mutans, Staphylococcus aureus and Lactobacillus spp. Staphylococcus aureus had the highest degree of occurrence with 31 isolates, followed by Streptococcus mutans with 23 isolates, while the least was Lactobacillus spp with 4 isolates. All the strains of Streptococcus mutans, and Staphylococcus aureus were sensitive to Tarivid (Ofloxacin) and Nitrofurantoin (Furadantin) and totally resistant to Septrin (Co-trimozazole) and Erythromycin (Ilotycin). Only a small percentage of these strains were sensitive to Chloramphenicol (Chloramex), Rocephine (ceftriaxone), Gentamycin (Geramycin), Tetracycline (Tetraxin), Zinnat (Cefuroxime) and Claforan (Cefotaxime). The Lactobacillus strains were totally resistant to all the antibiotics except Tarivid (Ofloxacin).

Conclusion: Tarivid (Ofloxacin) and Nitrofurantoin (Furadantin) can be use to treat cases of dental caries in our locality.

Keywords: Prevalence, Susceptibility pattern, Dental caries, Minna.

Introduction:

The mouth is a favourable habitat for a great variety of bacteria due to the presence of nutrient, epithelia debris and secretions. Oral bacterium includes Streptococci, Staphylococci, Lactobacilli and Corynebacteria with a great number of anaerobes. At birth the oral cavity is sterile but rapidly becomes colonized from the environment, particularly from the mother in the first feeding.⁽¹⁾ Considerable epidemiologic evidence links Streptococcus to caries and numerous laboratory investigations demonstrated the ability of strain of the species to produce the lactic acid which causes dental caries. A closely related lactate producing species *S. sorbivinus*, has also been linked to caries, although the prevalence is distinctly lower and this species is seldom found without *S. mutans*.⁽²⁾

Various Lactobacillus species have also been consistently associated with caries and are thought to be important secondary pathogens in dental caries. Actinomyces species have also been suspected to play a role in caries, with most evidence linking them to root surface caries. Other bacteria have been investigated as potential contributors to caries and several investigators have suggested that the pathobiology of caries may involve more complex communities of bacterial species than previously thought.⁽²⁾

The normal flora occupy available colonization site which make it more difficult for other micro organisms to become established. Indigenous oral flora contributes to immunity by inducing low level of circulating and secreting antibodies that may cross react with pathogen.⁽¹⁾ However, the normal oral bacteria flora

of human may harm the host since some of these bacteria are parasites which possess pathogenic potential. If certain oral bacteria are able to invade tissues not normally accessible to them, characteristic diseases result. For example, oral organisms gaining entrance into tissues (through surgical wounds) may cause abscesses of lungs, bone, alveolar, brain or the extremities.⁽³⁾

The aim of this study is to evaluate the occurrence of dental caries among patients attending Dental Unit of General Hospital Minna and to test for sensitivity to commonly used treatments.

Materials and Methods:

Collection of Samples

The samples used were obtained from 40 of the patients attending the Dental Unit of General Hospital Minna. In order to ensure uniform specimen collection from the oral cavity of the patients, only the investigator swabbed the patients using sterile cotton swab sticks. Specimen was taken from the carious tooth of each patient.

Isolation of Bacteria

The specimens were processed between two to three hours of collection. The specimens were inoculated on blood agar and nutrient agar plates. The plates were incubated at 37°C for 24 hours.

Identification of Bacterial Isolates

The bacterial isolates were characterized based on cell morphology and biochemical tests, including carbohydrate utilization profile. The organisms were identified by comparing their characteristics with those of known species as described by some of these tests are described as follows: Gram Staining, Catalase Test,

Coagulase Test, Carbohydrate Fermentation Test, Indole Test, Bile Solubility Test.

Results and Discussion:

Table 1 shows the percentage of occurrence of bacterial isolates. *Staphylococcus aureus* had the highest degree of occurrence, followed by *Streptococcus mutans* and the least were *Lactobacillus* species. Table 2 shows the antimicrobial susceptibility pattern of the isolates. All the strains of *Staphylococcus aureus*, *Streptococcus mutans*, isolates were sensitive to Tarivid and Nitrofurantoin. Only a small percentage was sensitive to Chloramphenicol, Rocephine, Gentamycin, Tetracyclin, Zinnat and Claforan, and totally resistant to Septrin and Fortum. The *Lactobacillus* spp were totally resistant to all the antimicrobial agents except Tarivid (Table 2).

The microorganisms isolated from 40 patients with dental caries at the Minna General Hospital were identified as *Streptococcus mutans*, *Staphylococcus aureus* and *Lactobacillus* spp. The *Lactobacillus* spp are part of the microorganisms generally constitute a major fraction of the oral flora. Their presence in the dental caries of the patients shows that they are opportunistic pathogens. The enamel is weakened by the activities of the *Streptococcus mutans* which is usually present in dental plaque. The pathogenic *Staphylococcus aureus* are transient microor-

ganisms in the mouth and are secondary invaders of the dental caries.⁽⁴⁾ Out of all the antimicrobial agents tested, Septrin and Fortum had no effect on all the isolates. The *Lactobacillus* strains were totally resistant to Chloramphenicol, Rocephine, Claforan, Nitrofurantoin, Tetracycline, Gentamicin and sensitive to Tarivid. About 90% of the strains *Streptococcus mutans* and *Staphylococcus aureus* were sensitive to Tarivid and Nitrofurantoin. The remaining 10% of these isolates were sensitive to Tetracycline, Gentamicin, Chloramphenicol, Rocephine, Claforan. It is interesting to note that all the isolates were sensitive to Tarivid. Similarly *Streptococcus* spp isolated from the mouth of patients attending the dental clinic was tested, in this study the investigators observed that most of the isolates were resistant to some particular treatments. This resistance pattern may be due to widespread abuse of antibiotics.⁽⁵⁾ This also explains why antimicrobial agents like Chloramphenicol, Rocephine, Claforan, Zinnat, Gentamicin, Fortum which are the common antibiotics usually effective in dental practice, were not effective in the present study. It is suggested that each institution should design its own antibiotic policy, and regular studies on antibiotics susceptibility patterns should be carried out to determine the effectiveness and usefulness of antimicrobial agents often prescribed in our locality.

Table 1. Frequency of Occurrence of bacterial isolates

Isolates	No. of isolates	Percentage of occurrence
S. aureus	31	53.4
S. mutans	23	39.7
Lactobacillus species	4	6.1
Total	58	100

Table 2. Antibiotics Susceptibility pattern of the isolates

Isolation No.	Antibiotics (Zone of Inhibition mm)									
	C	CRO	N	CTX	CXM	TE	CN	CAZ	SXT	OFX
001	20.0	NZ	12.0	NZ	NZ	NZ	NZ	NZ	NZ	19.0
002	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	20.0
003	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	19.1
004	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	NZ	19.0
005	NZ	NZ	14.0	NZ	NZ	NZ	NZ	NZ	NZ	28.0
006	11.1	NZ	12.0	10.0	6.0	4.0	12.2	NZ	NZ	22.0
007	10.0	NZ	12.0	7.0	2.0	NZ	3.0	NZ	NZ	26.0
008	9.0	4.0	22.0	10.0	NZ	13.0	8.0	NZ	NZ	23.0
009	9.0	10.0	24.0	9.1	NZ	10.0	8.0	NZ	NZ	22.1
010	5.0	8.1	20.0	8.0	NZ	4.0	22.0	NZ	NZ	20.0
011	5.0	6.0	11.1	10.0	NZ	10.0	10.0	NZ	NZ	21.0
012	3.0	10.0	6.0	9.0	NZ	13.0	8.0	NZ	NZ	19.0
013	NZ	9.0	5.0	10.0	3.0	13.0	9.0	NZ	NZ	21.0
014	10.0	14.0	13.0	7.0	6.0	13.0	14.0	NZ	NZ	21.0
015	12.1	7.0	2.0	13.0	NZ.	10.0	NZ	NZ	NZ	22.0
016	NZ	12.0	2.0	10.0	NZ	10.1	11.1	NZ	NZ	19.0
017	9.0	10.0	2.0	13.1	8.0	13.0	10.0	NZ	NZ	20.0
018	12.0	6.0	2.05	13.0	2.0	4.0	7.0	NZ	NZ	20.0
019	12.2	11.1	2.0	10.0	NZ	5.0	7.0	NZ	NZ	23.0
020	9.0	NZ	10.0	6.0	8.0	2.0	13.0	NZ	NZ	20.0
021	NZ	11.0	2.0	10.0	NZ	10.0	17.0	NZ	NZ	21.0
022	NZ	21.0	2.0	10.0	NZ	10.0	9.0	NZ	NZ	22.0
023	NZ	20.0	6.0	10.0	3.0	10.0	7.1	NZ	NZ	21.0
024	NZ	21.0	13.0	8.0	3.1	5.0	10.0	NZ	NZ	20.0
025	NZ	22.0	2.0	10.0	NZ	13.0	9.0	NZ	NZ	26.0
026	17.0	NZ	19.0	20.0	2.0	NZ	13.0	NZ	NZ	20.0
027	8.0	15.0	2.0	13.0	4.0	5.0	9.0	NZ	NZ	22.0
028	7.0	NZ	13.0	13.0	2.0	5.0	14.0	NZ	NZ	21.0
029	NZ	13.0	22.0	13.0	8.0	19.0	20.0	NZ	NZ	21.0
030	NZ	19.0	16.0	10.1	2.0	13.1	8.0	NZ	NZ	22.0
031	20.0	13.1	25.0	10.0	NZ	13.0	NZ	NZ	NZ	22.0
032	NZ	10.0	21.0	20.0	NZ	13.0	20.0	NZ	NZ	22.0
033	16.0	8.0	20.0	10.0	NZ	4.0	8.0	NZ	NZ	22.0
034	16.0	10.0	15.0	7.0	NZ	16.0	20.0	NZ	NZ	22.0
035	NZ	10.0	22.0	13.0	3.0	13.0	2.0	NZ	NZ	22.0
036	NZ	13.0	21.0	10.0	2.0	19.0	2.0	NZ	NZ	21.0
037	NZ	10.0	18.0	10.0	NZ	10.0	NZ	NZ	NZ	22.0
038	NZ	8.0	21.0	10.1	NZ	10.0	NZ	NZ	NZ	21.0
039	NZ	10.0	22.0	12.0	2.0	10.0	9.0	NZ	NZ	18.0
040		NZ	16.0	10.0	NZ	19.0	NZ	NZ	NZ	22.0

Conclusion:

Outcome of the present study has two noteworthy features. This study may help to suggest alternative possible antibiotics for the treatment of dental caries in our locality in place of the commonly abused ones. Secondly, it may be emphasized here that invitro antimicrobial susceptibil-

ity testing results for dental isolates need standardization with further studies.

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