

ISOLATION OF TOOTH CARIES BACTERIAL PATHOGENS

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Abstract

This investigation was conducted to isolate aerobic microorganisms from dental cavities. Patients that visited a clinic in Al-Hilla City, between 2021 and 2022 made up the research population. A total of (112) samples were gathered from people aged 5 to 68. Some were obtained by pressing a wooden stick against a local lesion or the gum edge that was linked to teeth, while the other samples were from teeth that were extracted by dentists at the dental clinic. Utilizing the help of a dentist, samples were taken with aseptic techniques. The samples were put into specially sterilized containers. Suffering from risk factors (diabetes, smoking, no brushing...etc.), Name, age, and date of the patient were taken. The materials were either processed right once or, if delayed, injected into a 24-hour brain-heart infusion. After being enhanced with a brain-heart infusion, the collected samples were grown on primary bacteriological media and incubated at 37°C for 24hrs. Visual growth on the inoculation plates was seen after incubation, and the morphology of the colonies was documented. Standard microbiological methods were used to identify the isolates, including Gram's staining, the morphological appearance of the colonies, and biochemical characteristics such as the catalase test, coagulase test, TSI, IMVIC, etc. From the (112) samples, 71 (63.4%) samples showed growth on the cultured media, it showed significant differences at age 13-35 years. The other 41 (36.6%) samples did not show any bacterial growth. The majority of bacteria isolated from patients with tooth caries were Streptococci, which were isolated at 53.5%, followed by *S. aureus*, which were isolated at 33.8%, and another Staphylococci were 12.7%.

In conclusion, *Streptococcus spp.* was the main bacteria that isolated from patients with tooth caries at age from 13-65 years due to exposure to different agents such as diabetes, smoking, improper brushing...etc.

Keywords: Sports Psychology, Sport Exercise, Bacteria, Caries, *Streptococcus*

Introduction

Acids that are produced as a consequence of acidogenic bacteria's carbohydrate metabolism and tooth caries are what caused the destruction of calcified tissue [Chandrabhan et al., 2012]. Because of the close proximity to dietary supplements, epithelia waste, and secretions, the mouth is an ideal home for a wide range of bacteria. *Streptococci*, *Staphylococci*, *Lactobacilli*, and *Corynebacteria* are among the oral bacteria, along with several anaerobes.

The mouth cavity is sterile at birth but quickly acquires bacteria from the environment, notably from the mother during the first feeding [Daniyan and Abalaka, 2011]. Dental caries affects 60 to 90% of schoolchildren and the

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great majority of adults, making it one of the most prevalent diseases in the world [Schwendicke et al., 2016]. It is also a very common oral illness in several Asian and Latin American countries, although it seems to be less prevalent and less severe in the majority of African countries [Oluremi et al., 2010].

Geographical and socioeconomic variables affect dental caries rates globally, and despite advancements, the majority of children continue to have dental caries, some of them severely. The most prevalent dental condition in children and an adult's risk factor for tooth loss is dental caries. Moynihan and Petersen, 2004].

Caries is defined as the localized destruction of dental tissues by bacterial activity [Ozdemir, 2014]. The primary causative factor in dental caries is bacterial plaque, which forms on tooth surfaces from naturally occurring oral flora [Maripandi et al., 2011]. Dental plaque forms continuously on tooth surfaces, and when bacteria in the plaque are exposed to fermentable carbohydrates, they produce acid. Acid lowers the pH in the mouth, which causes the enamel on the teeth to undergo a process called demineralization. Remineralization truly occurs over time; however, if demineralization outpaces remineralization, cavities develop in the teeth [Chambers, 2012].

A condensed explanation of the clinical etiology of tooth caries comprises, the presence of the plaque that contains both huge bacteria and bacteria that produce acid, frequent consumption of effectively fermentable carbohydrates (such as sugar), a lack of saliva production or a reduced saliva's ability to act as a buffer, and a genetic predisposition to caries [Salli and Ouwehand, 2015]. The most important bacteria in the pathogenesis of dental caries are streptococci (*Streptococcus mutans* and *Streptococcus sobrinus*) [Al-Mudallal et al., 2008], with lactobacilli and other microbes also playing a role in the development of the illness [Ozdemir, 2014].

Numerous opportunistic bacteria, including *Staphylococcus spp.* as well as another bacteria, must be considered as possible pathogens, especially in patients with neutropenia, diabetes mellitus, agranulocytosis, as well as AIDS [Cuesta et al., 2010]. While staphylococci are believed to be a temporary resident of the oral cavity [Nemoto et al., 2012], they are also suspected of being the cause of a number of oral diseases, including dental caries [Petti et al., 2011].

Social habits may interfere with the oral microflora's ability to adapt. Dietary

starches, such as mutans streptococci and lactobacilli, are cariogenic and aciduric (corrosive tolerant) species that may benefit from regular intake.

Studies have shown that diabetic people are more prone to oral tactile, periodontal, and salivary scattering, which might increase their risk of developing new and sporadic dental caries. Many older patients use a variety of medications, the side effects of which might reduce salivation and hence interfere with the normal adjustment of the local oral microbiota [Marsh and Martin, 2009].

In those who don't regularly brush their teeth, the prevalence of caries rises overall. Wei and Hyman claim that most children don't brush for long enough or well to fully achieve deplaqueing [Munjal et al., 2014].

This investigation was conducted to isolate aerobic microorganisms from dental cavities.

Materials and Methods

Patients that visited a clinic in Al-Hilla City, between 2021 and 2022 made up the research population. A total of (112) samples were gathered from people aged 5 to 68. Some were obtained by pressing a wooden stick against a local lesion or the gum edge that was linked to teeth, while the other samples were from teeth that were extracted by dentists at the dental clinic. Utilizing the help of a dentist, samples were taken with aseptic techniques. The samples were put into specially sterilized containers. Suffering from risk factors (diabetes, smoking, no brushing...etc.), Name, age, and date of the patient were taken.

The materials were either processed right once or, if delayed, injected into a 24-hour brain-heart infusion.

After being enhanced with a brain-heart infusion, the collected samples were grown on primary bacteriological media and incubated at 37°C for 24hrs. Visual growth on the inoculation plates was seen after incubation, and the morphology of the colonies was documented. Standard microbiological methods were used to identify the isolates, including Gram's staining, the morphological appearance of the colonies, and biochemical characteristics such as the catalase test, coagulase test, TSI, IMVIC, etc. [Oluremi et al., 2010, Maal et al., 2010, Elfaki et al., 2014, Yadav and Prakash, 2015].

Results and Discussions

From the (112) samples, 71 (63.4%) samples showed growth on the cultured media, it showed significant differences at age 13-35 years. The other 41 (36.6%) samples did not show any bacterial growth (Table 1).

It is difficult to compare our results with those of previous research because of the different age groups that these studies used. In our research, those aged 13 to 65 with risk factors including smoking, diabetes mellitus, and inconsistent tooth brushing had the highest isolation of microorganisms. Altayyar et al. observed in their research that (44.5%) of the isolates were from the age range of 16-68 years old and (55.5%) were from youngsters (5-15 years old), which is in contrast to our results. [Altayyar et al., 2015]; meanwhile, Borty et al found that the group of children under 15 years old had the lowest prevalence of infection (10.86%) [Borty et al., 2015].

The majority of bacteria isolated from patients with tooth caries were Streptococci, which were isolated at 53.5%, followed by *S. aureus*, which were isolated at 33.8%, and another Staphylococci were 12.7% (Table 2).

Table 1: Bacterial growth from patients with different ages.

Groups	Bacterial growth				Total samples (%)
	Positive samples (%)		Negative samples (%)		
	With risk	Without risk	With risk	Without risk	
5-12years	18 (36.7)	13 (26.5) **	4 (8.2)	14 (28.6) *	49 (43.8) **
13- 35 years	14 (56) **	2 (8)	3 (12)	6 (24)	25 (22.3)
36-65 years	19 (50) *	5 (13.2) *	11 (28.9) *	3 (7.9)	38 (33.9)
SubTotal	51 (45.5)	20 (17.9)	18 (16.1)	23 (20.5)	112 (100)
Total	71 (63.4) *		41 (36.6)		112

Table 2: General number and percentages of isolated bacteria from dental caries.

Name of bacteria	Number	Percentages
<i>Streptococcus spp</i>	38	53.5%
<i>Staphylococcus aureus</i>	24	33.8 %
Another staphylococcus	9	12.7%
Total	71	100%

Streptococcus spp. was the most frequent bacterium identified in kids with dental caries, followed by *C. albicans* and *Staph. aureus*, according to Prabil and Dalal, (2011) investigation on kids aged 5 to 14. In their investigation of children aged 1 to 15 years, According to Olajokun et al., [2008] *S. mutans*, *lactobacillus spp.*, as well as *S. aureus* were the most isolated pathogens.

Infections in the oral cavity are brought on by the staphylococci *Streptococcus spp.*, *S. aureus*, and other staphylococci [Cuesta et al., 2010]. Diabetes, immunodeficiency (such as AIDS), catheterized patients, and those receiving antimicrobial drugs are those who are most vulnerable to bacterial infections [Leboffe and Pierce, 2011].

Individuals with risk factors had a greater number and frequency of bacterial caries isolates than adults without risk factors. High saliva glucose concentrations in diabetes patients increase the amount of carbohydrates that oral microbes may ferment, leading to the production of acidic byproducts that demineralize teeth and result in dental caries. The abundance of glucose in saliva may potentially promote the growth of cariogenic bacteria and increase the frequency and duration of acidic episodes [Abayon, 2009]. Smoking increases neutrophil counts but decreases their ability to function, which deals with the first line of defense against microbes [Kentala, 2007].

On the other side, smokers' saliva may have a lower pH and less of a buffering effect, and their saliva may include more Lactobacilli and *Streptococcus viridnis*, which may indicate a greater susceptibility to tooth decay. Studies show that smokers had different eating habits, reportedly consuming a lot of sugar-containing foods like soda pops and snacks, in addition to having disgusting dental hygiene and a less developed attitude toward their health. Regular alcohol use and increased sugar use in tea or coffee were both linked to daily cigarette smoking. Additionally, smokers are found to wash their teeth less often than the non-smokers [Vellappally et al., 2007].

Conclusion

Streptococcus spp. was the main bacteria that isolated from patients with tooth caries at age from 13-65 years due to exposure to different agents such as diabetes, smoking, improper brushing...etc.

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