

Carriage rate of streptococcus species on gum of apparently healthy population in health and Medical Technology College

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Abstract

Background: Gum specimens were collected from the labial vestibule of mouth using swabs and sterile cotton were submitted to standard microbiological technique for the isolation and characterization of bacterial isolate. **Aims:** to estimate the carriage rate of streptococcus spp. on gum of healthy population. **Patients and Methods:** This study was conducted in the College of Health and Medical Technology and Teaching Laboratories of Medical City for the period from 1st September 2010 15th April /2011. A total of 757 participants were included .They were chosen randomly form staff and students of Health and Medical Technical College. **Results:** 69% of normal healthy individuals were carrier for *Streptococcus* spp. in the labial vestibule rate between male and female participants (64% vs 5%), ($P < 0.05$), there was significant difference in the gum carriage of *streptococcus Mutans* rate were 17% between male and female participants (16% vs 1%), ($P < 0.05$). However, the age group between (18-20 years) showed higher carriage of *Streptococcus salivarius*. The study also found that there was significant difference between the age group (18-20) which showed higher carriage of *Streptococcus mutans* rate compared to other age groups. On the other hand, slightly higher carriage rate was established among rural compared to urban population (341 % vs 416%), ($P > 0.05$). In addition, smoker participants (only male) had higher significant carriage rate in comparison with non –smokers (62.3% vs 37.7%), ($P > 0.05$). **Conclusions:** considerable proportion of healthy population carries *Streptococcus* species (spp.) in their labial vestibule.

Key Words: streptococcus spp., oral flora

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INTRODUCTION

There are many different types of bacteria in your mouth at all times .These are called normal flora. Some examples of normal flora in your mouth are *Streptococcus salivarius*, *Streptococcus mutans* and *Aectinomyces*. Different types of bacteria can grow in numerous ways.^[1] Some require oxygen (aerobic) and some will not grow when oxygen is present (anaerobic). *Streptococcus mutans* is a Gram–positive cocci, facultative anaerobic bacteria commonly found in the human oral cavity and is a significant contributor to tooth decay.^[2] The bacterium *Streptococcus salivarius* does require oxygen to grow and receives it nutrients from

many of the things we eat every day.^[2] Furthermore, studies the vast majority of the attention on the effect of probiotics in preventing or reducing the incidence of dental caries was directed towards the cariogenic bacteria *Streptococcus mutans*. Several clinical trials have shown that the inclusion of *Lactobacillus rhamnosus* GG in milk^[3] or processed cheese^[4] was associated in reduction of the incidence of dental caries in children. *Bifidobacterium lactis* in ice cream reduced oral *S.mutans* count.^[5] reported reduction in *S.mutans* count and subsequently dental caries incidence in children fed with cow milk fermented with *Lactobacillus reuteri*.^[6] Similar results were achieved when children ingested

fluids or capsules containing probiotics.^[7] The sugar substitute xylitol has been proved to reduce the incidence dental caries. In one study, *S. mutans* count was reduced comparably in children who used xylitol enriched or probiotics- enriched chewing gum.^[8] In other hand the *Lactobacillus reuteri* in fermented bovine milk decreases the oral carriage of *streptococcus mutans*. The daily ingestion of yoghurt containing *L. reuteri* for a period of two weeks significantly reduced the number of *Streptococcus mutans* in the saliva of healthy subjects.^[9] Although there are study in Iraq taken the effect of *streptococcus* spp. in mouth , and antimicrobial activity of crude extracts of some chewing sticks against microorganisms isolated form dental plaque and caries.^[10] The aim of study was to estimate the carriage rate of streptococcus spp. on gum of healthy population.

PATIENTS AND METHODS

This study was conducted in college of Health and Medical Technology and Teaching Laboratories /medical City/Baghdad during the period from 1st September 2010 to 15th April/ 2011.

A total of 757 participants were included .The were chosen randomly from staff and students Health and Medical Technical College. They were 568 males with mean age 25.8 ± 3.7 years and 189 females with mean 21.8 ± 5.6 years. Swabs of gum area were collected from the labial vestibule of mouth using sterile bacteriological swabs and cotton. Swabs were streaked immediately on blood ager plates and incubated for 24 hours at 37 °C. Suspected colonies on the bases of colonial morphology and gram –stained film were subcultured on Brain Heart infusion (pH 7.0), which was incubated aerobically for 18hr .at 37 °C. The isolation of *Streptococcus mutans*, using Bacitracin stock solution was prepared by dissolving 0.364 gm of powder (Bacitracin powder AI-Raze, Iraq), in 100ml of sterile deionized water , this will provide a concentration of 200 I. U/liter (1unit of bacitracin =0.0182 mg). The solution was sterilized by Millipore filter (Miller –GS) (0.45um) then kept in refrigerator until use. A new fresh solution was prepared every 2-3 weeks were prepared with Brain Heart Infusion Broth, this media is selective for cultivation of mutans streptococci because they contain anti-bacterial / agent inhibits the growth of all streptococcus spp and keeps streptococcus mutans, they appeared as spherical or ovoid in shape with raised or convex surface, light –blue in color about 1mm in diameter, adhered to the agar surface. Sometimes a glistening drop of polysaccharide on top of the colony or as a pool beside the colony was seen. Most of these isolates grew as irregular colonies

with rough or frosted –glass surface while other isolates of mutans streptococci appeared as circular convex colonies with smooth surfaces. A third phenotype was also isolated beside rough and smooth types which was the mucoid, appear as circular translucent in shape about 1-1.5 mm in diameter. All phenotypes were Gram's positive appeared as spherical or ovoid cells arranged in short or medium length chain. Mutans streptococci colonies were all catalase negative and have the ability to ferment mannitol and sorbitol. After incubation period an acid formed caused changes in color from red to yellow. The statistics were analyzed according Chi-Square ($P<0.05$).

RESULTS

The results showed that streptococcus spp. was detected in in 522 (69%) of participants , 484 (64%) were male carriers with mean age 25.68 ± 3.79 years, and 38 (5%) were female carriers with mean age (21.88 ± 5.6) years. Nevertheless, there was higher statistical difference in the carrier rate between male and female ($P<0.05$), table 1.

Table 1. Distribution of carriage rates of *Streptococcus* spp. according to the sex and age.

Sex	No. Tested	No. Carriers	Carrier rate	Age (mean $\pm$ SD)
Male	568	484	64%	25.7 $\pm$ 3.79
Female	189	38	5%	21.9 $\pm$ 5.6
Total	757	522	69%	23.8 $\pm$ 4.7

The distribution of carriers according to the age groups showed that the participants between (18-20) years harboring the highest carrier rates, table 2.

Table 2. Distribution of *Streptococcus* carriers according in age groups.

Age groups	No. Carrier	Carrier Rate (%)
18-20 (n=413)	291	38.6
21-25 (n=265)	189	25.5
26-30 (n=65)	32	4.2
31- 41(n=9)	8	1.3
41+ (n=5)	2	0.4
Total (n=757)	522	69

The distribution of streptococcus mutans carriers according to the sex showed that higher statistical difference in the carrier rate between male and female ($P>0.005$).table 3.

Table 3. Distribution of *Streptococcus Mutans* carriers according sex.

Sex	No. Carriers	No. S. Mutans Carrier	Carrier Rate (%)
Male	484	83	15.6
Female	38	6	1.7
Total	522	89	17

The distribution of streptococcus mutans carriers according to the age groups showed that the participants between (18-20) years harboring the highest carrier rates, table 4.

Table 4. Distribution of *Streptococcus Mutans* carriers according to age groups.

Age groups	No. Carrier	Carrier Rate (%)
18-20 (n=413)	54	10.2
21-25 (n=265)	27	5.2
26-30 (n=65)	6	1.2
31-41 (n=9)	1	0.2
41+ (n=5)	1	0.2
Total (757)	89	17

Regarding the residence, the results showed that those reside in the rural have differential rate of gum carriage (39% vs 21%). However, this result was statistically significant ($P < 0.05$), table (3).

Table 5. Distribution of carrier rates of *Streptococcus Mutans* according to the residence.

Residence	No. Carrier	Carrier rate (%)
Urban (n=416)	160	21
Rural (n=341)	295	39
Total (n=757)	455	60

DISCUSSION

Gum carriage of streptococcus spp. is an important risk factor for infection by this organism in both community and hospital settings. The present study found that 69% of normal healthy individuals in college of health and medical technology were carrier for *Streptococcus spp.* in the labial vestibule. These results are consistent with previous studies, which found 20 % to 70 % adult individuals carry *Streptococcus ssp.* In the gum.^[3,4] Another studies had distinguished three patterns of *Streptococcus spp.* Gum carriage, first, approximately 20% of healthy people almost always carry a strain, second a proximately 60 % of the population harbors *Streptococcus spp* intermittently and the strain change with varying frequency

The results also revealed that smoker participants have significantly higher rate of carrier compared to non-smoker male only (62.3% vs 37.7%), ($P < 0.05$), table (5).

Table 6. Distribution of carrier rates of *Streptococcus* according to the smoking (Male Only).

Smoking	No. Carrier	Carrier Rate (%)
Smoker (n=345)	302	62.3
Non-Smokers (n=223)	182	37.7
Total (n=568)	484	100

The results also revealed that prayer participants in significantly lower rate of carrier compared to non – prayers (41.1% vs 13.7%. $p > 0.05$), table (7).

Table 7. carrier rates of *Streptococcus spp.* among prayers and non –prayers participants.

Smoking	No. Carrier	Carrier Rate (%)
Prayers (n=520)	116	15.3
Non-prayers (n=237)	139	18.3
Total (757)	255	33.6

and third, only 20% almost never carry *Streptococcus*.^[8] Furthermore, a strong correlation has been found between strains colonizing the, strain labial vestibule isolated from foci of infection, and strains isolated from blood suggesting an endogenous origin of *Streptococcus spp.*^[4,8] In accordance with these results, *Streptococcus* infections have been particularly evident in patients after surgery, in peritoneal and hem dialysis and in other immunocompromised patients.^[5, 9]

The study also found that there is a significant difference in the gum carriage rate between male and female participants (64% vs 5%). The study also found that there is a significant difference in the gum carriage of *Streptococcus Mutans* rate were 17% between male and female participants (16%vs 1%).

However, the older age groups between (18-20 years) showed higher carriage of *Streptococcus* spp rate as compared to other age groups .These results may imply that the carriage rate is age dependent rather than sex. However; further studies are needed to clarify the effect of age and sex on the gum carriage of *Streptococcus* spp. The study also found that there is a significant different the older age groups between (18-20) showed higher carriage of *Streptococcus Mutans* rate compared to other age groups age groups .

These results may imply that the carriage rate is age dependent rather than sex dependent. However, further studies are needed to clarify the effect of age and sex on the of *Streptococcus* spp.

On the other hand, the slightly higher carriage rate among rural compared to urban population (39% vs 21%) may be related to personal hygiene, availability of municipal water. Similarly that insignificant carriage rate among non –prayers

compared to prayers (18.3% vs 15.3%). These results undoubtedly related to the good personal hygiene, as Muslims should clean his.^[7] With clean water three times before each prayer. The study also found that there is a significant difference in the gum carriage rate among non-smoker compared to smoker (62.3%vs 37.7 %), ($P>0.05$), (among males only these results related to the nicotine that vacillated the adherence the microbes on the Surface of tissue cells of gum.^[10] All participants were using the teeth brush .It can be concluded that considerable proportion of normal healthy population carry *Streptococcus* spp. in their labial vestibule aum carriage in this college. Treatment targets elimination of *Streptococcus* spp. specially *S. Mutans* reduces the rate of streptococcal gum infections specially *S. Mutans* is the cause of tooth decay and cavities. Further studies of biofilm formation and B. lactamase production of *Streptococcus* spp and their effect among carrier smoker peoples is needed.

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