Cancer infection and its relationship with *Streptococcus mitis* increasing numbers in human mouth

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Abstract— The study aimed to determine the relationship between the changes happened in numbers and kinds of bacteria in mouth of human and the cancer infection such as oral and digestion cancer consider the increasing and changes in bacteria kinds as early indicator to develop cancer in body. Saliva samples which not Stimulation, were collected from various places in Baghdad city from who not suffer from cancer infection but exposed to chemical or radiation components as first groups and the second groups consist of people exposed to chemical or radiation components. Samples collection from them after make sure they don't take food, no smoking or used toothpaste rinsing mouth at least for one hour before. Saliva were cultured on Mitis Salivarius agar cultured by spreading dilution on agar, incubated anaerobically for 48 hours .After bacteria calculated and diagnosed species by using biochemical fermentation of sugars and examination of catalase , in addition api 20 strep to examine the bacteria Streptococcus spp and showed results, the first group showed the highest percentage of type Streptococcus mitis at 13 persons and attributed the reason for being for a long time for the chemicals or radioactive materials as a result of the nature of their work or location of their home , the second group appeared to have the highest proportion of two types Streptococcus mutans or Streptococcus salivarius, that reflect increasing Streptococcus mitis in mouth saliva of human the first marker to cancerous disease.

Index Terms— Cancer, Saliva, S.salivarius, S.mitis, S.mutans, Streptococci, oral bacteria.

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1 INTRODUCTION

C ancer is one of death causing in every day that reflected from the ratio of person whom death from using tobacco and alcohol were 43%. In every years 10 million of new cases in a world and 6 million were died by cancer diseases "[1]". Some studies showed that the oral bacteria were increased in oral, pharyngeal and lymph node cancers "[2,3]" specially oral streptococci"[4,5]" and some anaerobic bacteria such as *Prevotella sp.* , *Veillonella sp.*, *Porphyromonas sp.* and *Capnocytophaga sp.* which were elevated too "[3,6,7]".

Cancer happened depending on presence of sugar ponds in cell membrane "[8]" which work as receptor to bacteria in limited types, the bacterial colonies changes in cancer cell bind to change cell surface receptor "[8,9]".

Persons who were infected with oral epithelial cell cancer showed increasing in numbers of *Streptococcus mitis* , *Prevotella melaninogenica* and *Capnocytophaga gingivalis* incomparison with healthy peoples "[10]" ,other causes of oral cancer were viral infection "[11]" , weak oral health and infected via Candida yeast types "[12]".

Some of germs relationship with type of cancer such as *Chlamydia trachomatis* related to cervical cancer"[13]" , *Streptococcus bovis* is contact with colon cancer "[14]" and *Helicobacter pylori* related to gastric glands "[15,16]".

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Different types of bacteria had several mechanism for playing role in development cancer, dependent on interaction and initiated severe inflammation with direct or indirect way "[17]" or from metabolism way for example; oral microflora in human induce cancer by convert alcohol to carcinogenic acetaldehyde by digest alcohol which leads to produce levels of acetaldehyde that induce DNA damage and increased epithelial cell division leading to cancer "[18,19]".Their presence *Streptococcus anginosus* DNA inside oral pharyngeal tumor cell "[5,20]".

Bacteria types of *Treponema denticola* , *Streptococcus mitis* and *S.anginosus* play a role in esophagus cancer due to induction inflammatory cytokines leading to increase the appearing   cancer and when decreased number of these bacteria decreased from infection risk "[21]".Bacteria has ability to convert alcohol to acetaldehyde via produced enzymes ; alcohol dehydrogenase (ADH) and cytochrome p450 oxidase (CYP) ,in addition, bacteria produce other very toxic material that played important role in causing cancer and in metabolism process ; acetaldehyde convert to acetate by acetaldehyde dehydrogenase (ALDH)"[22]"

Oral viridians Streptococci have ability to produce acetaldehyde invitro when incubated with alcohol where *S.salivarius* , *S.mitis* and *S.intermedius* produced large amount of acetaldehyde thus led to cancer "[23]" ,also Narikiyo et al.,2004 pointed S.mitis compose 43% in healthy persons and the increased about this considers indicator to cancer presence.

The study aimed to indicate Cancer as early as much by using natural flora as detector and early detector for persons whom had infected ability with cancer, so that we can avoid them from infection and help them with early treatment before focus cancer.

2 Materials and methods

2.1 Sample collection —
Saliva samples collection were 52 from different places in Baghdad City divided into 26 sample from people

whom were working in atomic energy institutions and 26 sample from other institutions and making sure not eating or smoking also didn't use toothpaste or rinses for at least one hour before collection samples, then kept them in sterile tubes and mixed by vortex to homogeneity of distribution bacteria in it.

2.2 Isolation and diagnosis bacteria —Serious dilution on saliva samples worked according to"[24]" and diagnosed bacteria morphology as "[25]".

2.3 Carbohydrate test and diagnosis with api —Used the carbohydrate fermentation as "[24]".

2.4 Numbering bacteria—Calculated bacterial colony depended on "[24]".

3 Statistical analysis

: The results analyzed by used t-test of *S.mitis* ratio of doubtful about them and the results show significant differences under $p<0.05$, this results confirms that the whenever higher the percentage of bacteria more than 50% whenever the result (table 3) was more significant "[26]".

4 Results

The colony of Streptococci appear different shape because different types on mitis salivarius agar (Fig 1). After work a slide from bacteria and staining with gram stain *Streptococcus* cells appear positive cocci form strep under microscope (Fig 2) .The Negative to catalase test ,diagnosis of Streptococci by sugars fermentation and api 20 Strep appears 5 types of *Streptococcus* which is *S.mutans* , *S.sobrenus* , *S.salivarius* , *S.oralis* , *S.mitis* and *S.mitor* (Fig 3, 4) (Table 1).

After diagnosis bacteria ; calculated more appear type in every person mouth ratio to other types , in 13 person from 52 the more appear type is *S.mitis* and in the other person the more appear type is neither *S.salivarius* or *S.mutans* , the mean of percentage is 72.4% to 13 person , the minimum percentage is 55% and the maximum is over than 95% and the more repeating in the percentage 70% and 80% to 13 person ,the other person, the mean is 13% the minimum percentage is zero and the maximum is 40% the more repeating in the percentage less than 10%.

The total number of genus *Streptococcus* is $0.3 * 10^6$-$289 * 10^6$ cell / ml at exposed persons to chemical or radioactive materials and $1 * 10^6$- $550 * 10^6$ cell/ ml at non-exposed persons (Table 2).
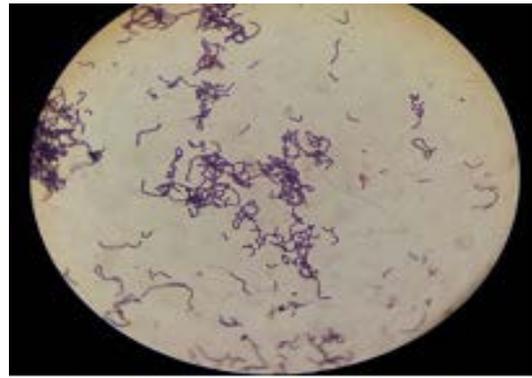

Fig 2: Streptococcus cell under light microscope * 1000

Fig 3 carbohydrate fermentation to Streptococcus

a- Trihalose b-Inuline c- Rafenose

d-Lactose e-Manetol f-Sorbetol

Fig 4: api 20 Strep

Fig 1 : Streptococcus sp. colony on mitis salivarius agar.

Table 1 : sugar fermentation of Streptococci

Type of bacteria	trihalose	inudin	lactose	rafenose	sorbetol	manetol
S.sobrinus	+	+	+	+	-	+
S.oralis	+	-	+	-	+	+
S.mutans	+	+	+	+	+	+
S.mitis	+	-	+	-	-	-
S.mitor	-	+	-	-	-	-
S.salivarius	-	-	+	-	-	-

Table 2: total number bacteria in all groups

Bacterial type	Exposure Cell/ml	Non – exposure Cell/ml
Streptococcus spp	$0.3 * 10^6 – 289 * 10^6$	$1 * 10^6 - 550 * 10^6$

Table 3 :(t) test to S.mitis Ratio for persons who exposed to cancer infection

acterial type	Number of samples	t table	t calculated	Standard error	P value
S.mitis	15	2.8	5	0.054	0.05

5 Discussions

Early detection followed by appropriate treatment, can increase cure rates to 80 or 90%, and greatly improve the quality of life by minimizing extensive, debilitating treatments"[27]". Despite the accessibility of the oral cavity to direct examination, these malignancies are often not detected until a late stage "[28,29]". Oral cancer is unusual in that it carries a high risk of second primary tumors. Patients who survive a first cancer of the oral cavity have up to a 20-fold increased risk of developing a second primary oral cancer and that risk lasts 5–10 years and sometimes longer major risk factors for oral .

The reason for these shifts in bacterial colonization of cancer lesions is unclear. Mechanistic studies of bacterial attachment provide

some insights, however. Research has repeatedly shown that oral bacteria demonstrate specific tropisms toward different biological surfaces in the oral cavity such as the teeth, mucosa, and other bacteria "[29,30]". The non-shedding surfaces of the teeth offer a far different habitat than the continually shedding surfaces of the oral mucosa. Due to the repeated shedding of epithelial cells, there is less time for a complex biofilm to develop on soft tissue surfaces; thus, a premium is placed on potent mechanisms of adhesion. The differences in bacterial tropisms for specific oral sites suggest that different intra-oral surfaces and bacterial species have different receptors and adhesion molecules that dictate the colonization of different oral surfaces.

It is now recognized that bacteria bind to and colonize mucosal surfaces in a highly selective manner via a "lockand key" mechanism. Adhesins on bacteria bind specifically to complementary receptors on the mucosal surfaces of the host. These adhesins differ from species to species leading to specificity in attachment to different surfaces. Studies have shown that even within genera, colonization patterns of individual species may differ markedly "[29,31]". *Streptococcus salivarius*, for example, preferentially colonized the oral soft tissues and saliva compared to the teeth, while the reverse was true of Streptococcus sanguis.

Each of"[10,21]" pointed *S.mitis* increased more than other Streptococci in oral infected with oral cancer and esophagus cancer . the 13 person which are increased *S.mitis* ; 8 persons of them worked at atomic energy and 4 of them work in chemical materials for a long time and the last one he live near oil filtration site .Narikiyo and other in 2004 pointed *S.mitis* compose 43% in healthy persons and when increased over that considers indicator to cancer present.

6 Conclusions

The results reflected; increased the number of *S.mitis* at exposed persons to chemicals or radioactive materials to a long time and the percentage over 50 % that persons have readiness to infecte with cancer diseases.

7 Acknowledgments

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