Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 07, pp.70978-70982, July, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

COMPARISON OF SELECTED ORAL MICROORGANISM AMONG INTELLECTUAL DISABLED PEOPLE AND NORMAL PEOPLE

[1,*]Rwan Aldakheel, [1]Haifa Alhussein, [1]Hanoufalwabli, [1]Alanoud Alammar, [1]Darine Sadig, [2]YusraAlkamali and [3]Dalia Sharafeldin

[1]Dental Intern, Riyad Elm University Riyadh, Saudi Arabia
[2]Lecturer of statistics, KSA
[3]Assistant Professor, Microbiology, Faculty at Riyad Elm University Riyadh, Saudi Arabia

ARTICLE INFO

Article History:
Received 18th April, 2018
Received in revised form
17th May, 2018
Accepted 04th June, 2018
Published online 30th July, 2018

Key words:
Intellectually Disability,
Dental Caries,
Streptococcus Mutans,
Lactobacilli, Candida Albicans.

ABSTRACT

Comparison of selected oral microorganisms among intellectual disabled people and normal people
Objective: The aim of this study is to determine and evaluate the types and prevalence of selected microorganisms in the oral cavity of intellectual disabled patients compared to normal people.
Material and methods: This study included sixty participants aged from 14-24 years old, 30 control healthy participants, and 30 case of intellectually disabled participants from the female day care center school diagnosed as intellectually disables.
Saliva samples from the participants were tested for Streptococcus mutans , lactobacilli , and candida, as well as PH buffering capacity of saliva, using caries risk test (CRT) for Both Streptococcus mutans lactobacilli and PH, sabouraud agar medium was the culture medium for candida albicans. The statistical analysis included chi-square and Mann-Whitney U tests was carried out.
Result: The case group show, colonies of streptococcus mutans ≥105 (56.7%) and <105 (43.3%) compared to the control group sample showed ≥105 (0%) and <105 (100%) . And for the lactobacillus case group showed ≥105 (73.3%) and <105 (26.7%) compared to control group ≥105 (43.3%) and <105 (56.7%). Candida was positive in 100% of case group, while control group was positive in 53.3% of the samples. For PH there was no significant difference for medium and high PH between the case and control group, but there is a difference for low PH in control group 3/30 samples (10%) and study group 11/30 samples (36.7%)
Conclusion: The present cross sectional study suggests that there is a statistically significant difference in the candida and cariogenic bacteria (streptococcus mutans, lactobacillus) a high prevalence of the oral microorganisms (candida, SM, LB) among females with ID. There is a significant difference in low salivary PH in non-ID female patients compared to ID patients.

Citation: Rwan Aldakheel, Haifa Alhussein, Hanoufalwabli, Alanoud Alammar, Darine Sadig, YusraAlkamali and Dalia Sharafeldin, 2018. "Comparison of selected oral microorganism among intellectual disabled people and normal people", *International Journal of Current Research*, 10, (7), 70978-70982.

INTRODUCTION

Disability is a condition or function judged to be significantly impaired relative to the usual standard of an individual or group. The term refers to an individual functioning, mental illness, including physical, sensory, cognitive and intellectual impairment, and various types of chronic disease (Radha *et al*., ?; Glassman, 2003). The term "intellectual disability" (ID), formerly "mental retardation," refers to significant limitations in both intellectual functioning and adaptive behavior, with onset before age 18 years ID is a type of developmental disability (DD), a broader category representing various severe chronic conditions associated with physical impairments, mental impairments or both that are identified during childhood (John P. Morgan *et al*., 2012; American, 2012). Oral disease is a major health problem for adults with disabilities, (American, 2012) who have higher prevalence and severity of oral diseases compared to the general population (Faulks, 2000; Beange, 1996). Individuals with disabilities are at greater risk for poorer oral health compared to a person in the general population,Due to difficulties in carrying out motor activities such as chewing and toothbrushing, these patients prefer a diet in the form of puree or paste, which is more cariogenic (Ceyhan Altun, 2010; Dorelia Lucia Cãlin1, 2010).

Corresponding author: **Rwan Aldakheel**
Dental Intern, Riyad Elm University Riyadh, Saudi Arabia
DOI: https://doi.org/10.24941/ijcr.29622.07.2018

immune deficiency and early enhanced colonization of the oral cavity with periodontopathic bacteria however, it's important for a clinician to choose among the various techniques available for prevention of oral diseases (Sayeqh *et al*., 2005; Camila Faria Carrada *et al*., 2016). Poor oral health results into the most common dental problem, i.e., Dental caries is the most prevalence disease among intellectually disabled children worldwide and "dental treatment is the greatest unattended health need of the disabled" (Sayeqh *et al*., 2005; Manish Jain, 2009). The oral cavity shelters very numerous and various microbial flora. One major actor of this complex ecosystem is dental plaque which develops naturally on the oral tissue. When the equilibrium is compromised and when an imbalance appears among the indigenous bacteria, pathologies such as dental caries or periodontitis could occur (Hennequin, 2000; Badet, 2008). Based on the data in the previous literature reviews, there's lack of studies on the caries-saliva-microorganism relationship, there is a need for studies that better elucidate the ecological characteristics of the oral cavity in patients who require special care, who naturally may have special physiological and microbiological characteristics (Liljemark *et al*., 1996). Life-style factors such as dietary habits and oral hygiene modifies the disease's progression. The association of lactobacilli and mutans streptococci with caries development is linked with carbohydrate consumption, there's a high prevalence of poor oral hygiene and gingivitis in individuals with intellectual disability. When plaque increases in thickness, there is usually an increase in proportion of Gram-negative bacteria. Detection of these organisms is essential for dental caries prediction and subsequent treatment (De Castilho, 2011; Yuki Oda *et al*., 2015). Historically, lactobacilli were the first microorganisms implicated in dental caries development (Okada *et al*., 2005). Mutans streptococci are considered to be the major etiologic agents of dental caries in humans. These bacteria are the most common putative pathogens isolated from human dental plaque and their prevalence has been reported in epidemiological studies (Owen, 1949; Hamada, 1980; Whiley, 1998).

MATERIALS AND METHODOS

This study included sixty participants aged from 14 -24 years old, 30 healthy participants, and 30 intellectually disabled participants from the female day care center school diagnosed as (intellectually disabled).The informed consent was issued from REU, and approved by the parents and the school for each individual, salivary samples were collected from the participants, stimulation of saliva was conducted by chewing a piece of paraffin gum for 1 minute, saliva samples were collected in sterilized plastic cups 3 mm each , for the individuals who did not have the mental capacity to understand the request of chewing paraffin gum and provide a saliva sample, a dropper was used to draw the saliva from the floor of the mouth manually (for approximately 10 minutes) , an ice container was used to store the saliva samples and was delivered to the microbiology laboratory at REU (2-3 hours.)

Microbiological procedures: Qualitative and quantitative analysis of *Streptococcus mutans*, lactobacilli, and candida was. Carried out to all saliva samples as well as PH buffering capacity of the saliva was examined using caries risk test (CRT) for Both *Streptococcus mutans*, and lactobacilli, sabouraud agar medium for *candida albicans* and PH test strip.

***Streptococcus mutans* and lactobacilli:** The sample tubes were put in the laminar flow, a sterile dropper was used to draw the saliva from the plastic cup, 1 ml of saliva was dropped on the CRT *Streptoccusmutans* test side and 1 ml on the lactobacilli CRT test side, sodium monocarbonate tablets was added to the tube to accelerate the growth, after that it was placed in the incubator for 48 hours.

Examination of Candida: In the laminar flow, Sterile sabouraud dextrose agar plates were inoculated each with 1ml of saliva sample, Which was distributed evenly using a sterile loop, then incubated at 37^0C for 48 hours. After the plates were inspected for the presence or absence of characteristic Candida sp. Colonies were closely examined microscopically to confirm the characteristic morphology of the organism. The count of *C.albicans* in each plate was determined by viable count plate method.

PH test strip: A sterile dropper was used to draw saliva, one drop was placed on the PH strip for 5 minutes to determine the buffering capacity whether its low, medium, or high, and each sample was recorded.

Statistical Analysis: The aim of this analysis is to compare the presence and counts of some bacteria between the control and case groups. The data were analyzed using SPSS version 20 . Shapiro -Wilks test used to test the normality assumption of the data, the result shows that the data were not normally distributed

RESULTS

Non-parametric test Mann-Whitney U test was used to test the significant difference counts of Candida bacteria between the case and control groups. Odds Ratio is used to compare the relative odds of occurrence of bacteria (Lactobacillus) in groups. Chi Square test used to compare the proportion of bacteria between groups. Frequencies and percentages were used to describe the presence or absence of bacteria. Chi square test was used to compare between the low, medium and high ph, percentages was used to describe the significant difference.

Table 1. Candida descriptive statistics

		Case	Control
Sabouraud dextrose agar	Yes	30(100%)	16(53.3%)
	No	0%	14(46.7%)
Total		30	30

(Tables 2,3) Mann-Whitney U test was used to test the significant difference of count for Candida between case and control groups. The result shows that there is a high statistical significant difference (Mann-Whitney U =34, P value=0.000). (Table & Figure 2) shows that the case group (Mean Rank=44.37) has a higher significant count of Candida compared with the control group (Mean rank=16.63).

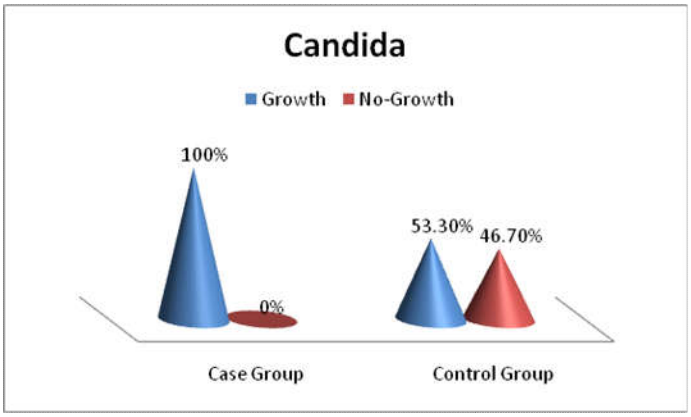


Figure 1. Distribution of candida between Case and control groups

Table 2.

Ranks				
	sample	N	Mean Rank	Sum of Ranks
Count of Candida	Control Group	30	16.63	499.00
	Case Group	30	44.37	1331.00
	Total	60		

Table 3.

Test Statistics[a]	
	count
Mann-Whitney U	34.000
Wilcoxon W	499.000
Z	-6.121
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: sample	

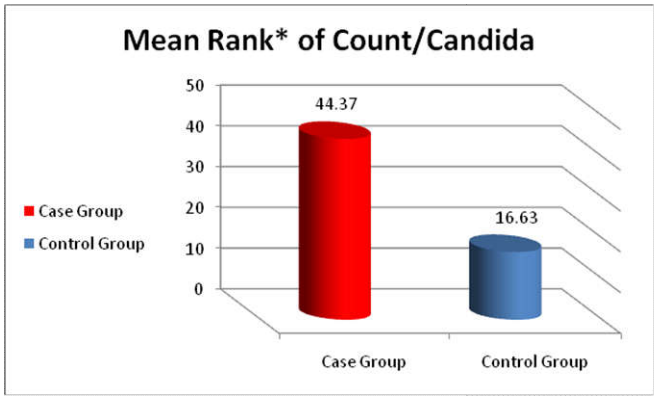


Figure 2. Mean Rank represents how much count of Candida in each group

(Table 4) Lactobacillus descriptive statistics, Odds ratio for Lactobacillus ≥105 for case v.s control equals 3.6 with confidence Interval (1.22, 10.6) means that the case group is 3.6 times more likely to have Lactobacillus ≥105 compared with the control group.. (p-value =0.021).There is a significant association between groups and

Lactobacillus

		Lactobacillus	
		$\geq 10^5$	$<10^5$
	Case	22(73.3%)	8(26.7%)
	Control	13(43.3%)	17(56.7%)
Total		30	30

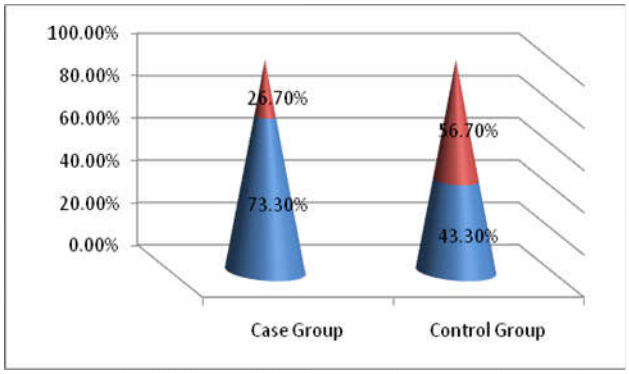


Figure 3. Distribution of Lactobacillus between Case and control groups

Table 5. Streptococcus mutans descriptive statistics

		Streptococcusmutans	
		$\geq 10^5$	$<10^5$
	Case	17(56.7%)	13(43.3%)
	Control	0(0%)	30(100%)
Total		30	30

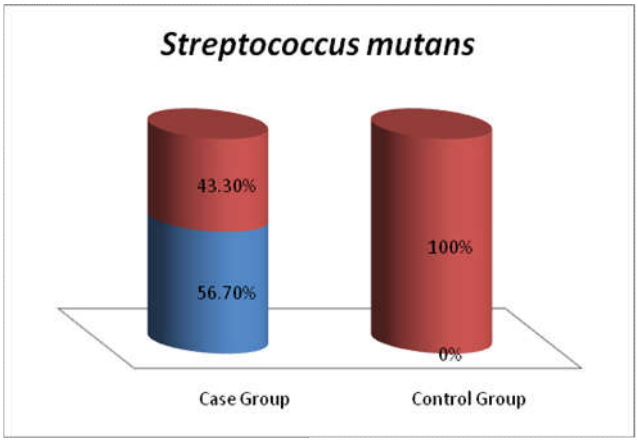
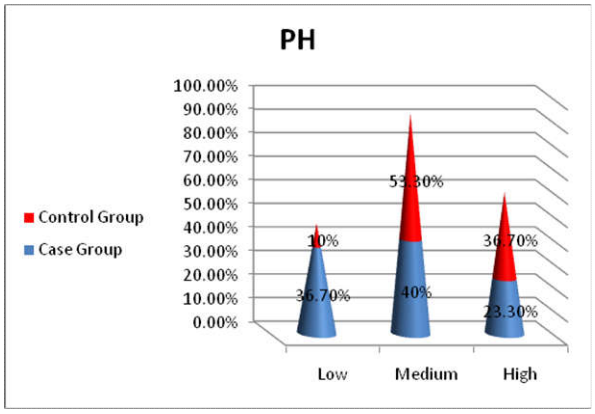


Figure 4. Distribution of Streptococcus mutans between Case and control groups

Table 6. PH descriptive statistics

		Control Group	Case Group	Chi -square test, P-value	Total
PH	Low	3(10%)	11(36.7%)	=5.88 , p-value=0.015 significant difference	14
	Medium	16(53.3%)	12(40%)	1 ,p-value=0.3 Not significant difference	28
	High	11(36.7%)	7(23.3%)	1 ,p-value=0.26 Not significant difference	18



(Figure 5) Distribution of salivary PH between Case and control groups

DISCUSSION

The knowledge about the oral health status of different populations is important to establish preventive and therapeutic strategies (Takahashi, 2011). Although studies about the oral health status of DS patients are numerous in the literature, they have produced controversial results. Individuals who are intellectually disabled and cared for at home by family members often suffer from poor oral hygiene, as they have been reported to have higher bacterial counts compared to individuals with no disabilities (Maurico, 2015). The most common opportunistic infection affecting the oral cavity is candidiasis (Loesche, 1982), the present study results indicates that the prevalence growth of candida in female patients aged from 14 to 24 years old with Intellectual disability is 100%, and in the control group is 53.3%, which is in agreement with studies conducted in ID individuals (gousemohiddin 2014) found that the study group is 74%, and in the control group 36%. The Lactobacillus count represents the number of lactobacilli present in 1ml of saliva (CFU/ml). It's used to determine the efficiency of dietetic measures or to evaluate the caries risk, A strong correlation has been established between the Lactobacillus count and caries (C. Badet 2008), For lactobacillus the ID showed 73.3% ($\geq 10^5$) and 26.7% ($<10^5$), the NID showed 43.3% ($\geq 10^5$) and 56.7% ($<10^5$).that means the case group is 3.6 times more likely to have Lactobacillus $\geq 10^5$ compared with the control group.

Streptococcus mutans showed growth in ID samples 56.7% ($\geq 10^5$) and 43.3% ($<10^5$), NID 0 % ($\geq 10^5$), 100% ($<10^5$), which is in agreement with a similar study (yukioda and 2015) which indicates that the prevalence of streptococci in patients with ID is 96.6%. Another study with surveys conducted in school children in different parts of the world (Gouse Mohiddin *et al*., 2015; Köhler, 1987; del Rio, 1991; el-Nadeef, 1994), while the prevalence of mutans streptococci in adults has been reported to be greater than 60 % (29) and 82.7 % aged 1– 48 years old (30). Regarding the PH there's no significant difference between medium and high PH in the study and control group, but there is a difference in low PH ID group (36.7%). And NID group (10%). The findings in the present study are in accordance with the study done by Shapira *et al*. who did not find any statistical significant differences in plaque and salivary pH among the three group Down syndrome, children with other ID and healthy children (31), The results were contrary to the study done by Stabholz *et al*. (1991) who found statistically significant difference in plaque and salivary pH between children with NID and children with ID who had comparatively lower salivary and plaque pH (32).

Conclusion

The oral cavity is an environment heavily colonized by microorganisms. The present cross-sectional study suggests that there is a statistically significant difference in the candida and cariogenic bacteria, lactobacillus among female adolescents and young adults with intellectual disabilities and non intellectual disabilities with a high prevalence of the oral microorganisms (candida and, LB) among females with ID. There is a significant difference in low salivary PH in non ID female patients compared to ID patients, no significant difference was found in patients with medium and high PH.

Recommendation

As the candida is an etiological agent of oral candidiasis and in case of immunocompromised individuals it could be invasive microorganisms , also lactobacillus is the leading cariogenic organism, we recommend the caregivers to the intellectually disabled individuals to be aware about these informations to give proper care to avoid complications of these microorganisms ,We recommend ID patients to visit the dentist regularly due to the high bacteria prevalence in the oral cavity and the low PH.

REFERENCES

American Association on Intellectual and Developmental Disabilities. Definition of intellectual disability. Accessed June 8, 2012.

Badet, C. and Thebaud, N.B. 2008. Ecology of Lactobacilli in the Oral Cavity. *The Open Microbiology Journal*, 2, 38-48.

Beange H. 1996. Caring for a vulnerable population: Who will take responsibility for those getting a raw deal from the health care system, *Med J.,* Aust;164:159-160.

Camila Faria Carrada, Flávia Almeida Ribeiro Scalioni, Dionéia Evangelista Cesar, Karina Lopes Devito, Luiz Cláudio Ribeiro, Rosangela Almeida Ribeiro. 2016. Salivary Periodontopathic Bacteria in Children and Adolescents with Down Syndrom, PLoS ONE, Vol. 11 Issue 10, p1-13. 13p

Ceyhan Altun, GunseliGuven, Ozlem Marti Akgun, Meltem Derya Akkurt, Feridun Basak, Erman Akbulut. October 2010, Oral Health Status of Disabled Individuals Attending Special Schools. *European Journal of Dentistry*, - Vol.4 p:361- 366.

De Castilho AR, 2011. Dental caries experience in relation to salivary findings and molecular identification of S. mutans and S. sobrinus in subjects with Down syndrome. Odontology (Odontology; Vol. 99 (2), pp. 162-7

De Castilho AR, Pardi V, Pereira CV. 2011. Dental caries experience in relation to salivary findings and molecular identification of S. mutans and S. sobrinus in subjects with Down syndrome. *Odontology*. 99:162–7.

del Rio GI. 1991. Dental caries and mutans streptococci in selected groups of urban and native Indian schoolchildren in Mexico. Community Dent Oral Epidemiol.;19:98–100.

Dorelia Lucia Cãlin1, L.L. Frâncu 2010. The assessment of dmf index and of the s. mutans in institutionalized patientswith mental retardation, Romanian Journal of Functional & Clinical, Macro- & Microscopical Anatomy & of Anthropology / RevistaRomâna de Anatomie

Functionalasi Clinica, Macro si Microscopicasi de Antropologie, Vol. 9 Issue 4, p431-436. 6p. 5

el-Nadeef MA, Adegbembo AO, Adeyinka A. 1994 Distribution of mutans streptococci among Nigerian school children. *Afr Dent J*., 8:11–5.

Faulks D, Hennequin M. 2000. Evaluation of a long-term oral health program by carers of children and adults with intellectual disabilities. Spec Care Dentist;20:199-208.

Glassman p, miller C. 2003 dental disease prevention and people with special needs, *J calif Dent Assoc*., 31:149-60.

Gouse Mohiddin, Aravindha Ba Bu, Narayanaswamy, Masthan K. M. K., Anithanagarajan, Abikshyeet Panda, Shyam Sundar Behura. 2015. Oral candida and streptococcal carriage in down syndrome patients,Journal of Natural Science, Biology and Medicine, Vol 6, Issue 2.p:300-305

Hamada S, Slade HD Biology, 1980. immunology, and cariogenicity of Streptococcus mutans. *Microbiol* Rev 44, 331-384.

Hennequinm, Faulks D, roux 2000. daccuracy of estimation of dental treatment need in special care patient, *j dent.,* 28,131-136

John P. Morgan , DDS, Paula M. Minihan, PhD, MPH, Paul C. Stark, MS, ScD, Matthew D. Finkelman, PhD, Konstantina E. Yantsides, BS, Angel Park, MS, MPH, Carrie J. Nobles, MPH, Wen Tao, MA, MM, and Aviva Must, PhD, 2012. The oral health status of 4,732 adults with intellectual and developmental disabilities, *J Am Dent Assoc*., Aug; 143(8): 838–846.

Köhler B, Bjarnason, 1987 S. Mutans streptococci, lactobacilli and caries prevalence in 11- and 12-year-old Icelandic children. Community Dent Oral Epidemiol;15:332–5.

Liljemark W.F. and Bloomquist C. 1996, Human oral microbial ecology and dental caries and periodontal diseases. *Crit Rev Oral Biol Med*., 7(2): 180-198.

Lindquist B, Emilson CG. 2004. Colonization of Streptococcus mutans and Streptococcus sobrinus genotypes and caries development in children to mothers harboring both species. *Caries Res*., 38:95–103.

Loesche WL. 1982. Dental caries: a treatable infection. Sprinfield, Illisois: Charles C Thomas.

Manish Jain, Anmolmathur, Leenasawla, Geetakomalkabra, Prabuduraiswamy, Prabuduraiswamy, 2009. Oral health status of mentally disabled subjects *in india journal of oral* science , vol.51,no.3,333-34

Maurico josesantosmoreira, DDS, MSc, Caroline Schwertner, Debora Grando, Lavinia Schuler Faccini, MD, phD, Lina Naomi Hashhizume, DDS, phD. Jul/Aug2015 oral health status and silvery levels of mutans streptococci in children with down syndrome.Pediatric Dentistry; 37(4): 355-360. (6p)

Okada M, Soda Y, Hayashi F, Doi T, Suzuki J, Miura K *et al*. 2005. Longitudinal study of dental caries incidence associated with Streptococcus mutans and Streptococcus sobrinus in pre-school children. *J Med Microbiol* 54, 661-665.

Owen OW. 1949. A study of bacterial counts (lactobacilli) in saliva related to orthodontic appliances. *Amer J Orthodont*; 35: 672-678.

Radha G, Swathi V, Abhishek Jha.2016 , assessment of slivary and plaque ph and oral health status among children with and without intellectual disabilities. *Journal of the Indian Society of Pedodontics & Preventive Dentistry*. 34(3): 257-261. (5p)

Rodis OM, Matsumura S, Kariya N, Okazaki Y, Ogata S, Reissmann DR. 2009. Culture-based PCR analysis of plaque samples of Japanese school children to assess the presence of six common cariogenic bacteria and its association with caries risk. *Mol Cell Probes*., 23:259–63

Sayeqh A, Dini EL, Holt RD, Bedi R. 2005. Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J Dent*., 33:379-88.

Sayeqh A, Dini EL, Holt RD, Bedi R. 2005. Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J Dent.,* 33:379-88.

Shapira J, Stabholz A, Schurr D, Sela MN, Mann J. 1991. Caries levels, Streptococcus mutans counts, salivary pH, and periodontal treatment needs of adult Down syndrome patients. *Spec Care Dentist*.,11:248-51.

Stabholz A, Mann J, Sela M, Schurr D, Steinberg D, Shapira J. 1991. Caries experience, periodontal treatment needs, salivary pH, and Streptococcus mutans counts in a preadolescent Down syndrome population. *Spec Care Dentist*., 11:203-8.

Takahashi N, Nyvad B, 2011. The role of bacteria in the caries process: ecological perspectives. *J Dent Res*., 90, 294-303.

Whiley RA, Beighton D, 1998. Current classification of the oral streptococci. *Oral Microbiol Immunol* 13, 195-216.

Yuki Oda, Fumiko Hayashi and Mitsugi Okada. 2015. Five-year Longitudinal study of dental caries incidence associated with Streptococcus mutans and Streptococcus sobrinus in patients with intellectual disabilities. BMC, Oral15:102

****