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Assessment of caries susceptibility in school children using Snyder test

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Abstract

The Snyder test measures the time required for the Lactobacilli in the saliva test sample to produce a degree of acidity which causes a particular colour change of the indicator. Application of Snyder's test seems to be especially useful in the fields of orthodontics, in the preventive dentistry for children and in public health surveys. One hundred school children of 4-14 years age group were randomly selected. Informed consent was obtained from the parents of the children before conducting the study. The saliva sample was collected by spitting method and the Snyder test was performed. In this study the caries experience was found to be significantly more in children who showed marked changes in the colour indicating a high degree of correlation of Snyder test with caries Index.

Aims: To study the caries susceptibility and reliability of Snyder test to assess caries susceptibility in school children

Settings and Design: One hundred school children of 4-14 years age group were randomly selected. Informed consent was obtained from the parents of the children before conducting the study.

Methods and Material: The collection of saliva was made under similar conditions at the same time. The patients were instructed to take lunch and drink water at 11 am and not to consume anything after that. The saliva was collected for the Snyder test.

Statistical analysis used: The data was analyzed using Statistical Package for Social Science (SPSS) version 11.5 (SPSS Inc., Chicago, Ill.).

Results: With decrease in pH of the saliva the children are more susceptible to dental caries. At pH above 6, children did not show any change in colour, demonstrating that as the pH of saliva is increased or towards normal the tendency towards dental caries decreases

Conclusions: The caries experience was found to be significantly more in children who showed marked changes in the colour indicating a high degree of correlation of Snyder test with DMFT/dmft Index.

Keywords: snyder test, caries activity, lactobacilli

1. Introduction

The prevalence of dental caries is higher in children and adolescents. Most individuals have low or moderate caries activity while only a small group develops extensive caries. By identifying these individuals with a high caries risk^[1], prevention of the progression of dental caries will help in reducing incidence of the disease process. Hence there is a necessity to perform caries risk assessments on the patients so that they receive appropriate caries preventive treatment.

The test or tests needed should be simple and accurate enough to predict future caries risk. Parameters to predict caries activity that have been used before include the number of incipient caries lesions, past caries experience, oral hygiene practices, dietary habits, buffer capacity of saliva, rate of plaque formation and microbiological tests.

Streptococcus Mutans are the primary initiators of the formation of carious lesions, Lactobacilli contribute substantially to the propagation of the lesion due to their ability to survive at a lower pH than Streptococcus Mutans. Lactobacilli counts are often used to determine a patient's compliance to dietary changes^[1]. though lactobacilli are late colonizers of the mouth; they potently contribute to the demineralization of the teeth by production of acid. Their numbers in saliva appear to reflect the consumption of simple carbohydrates by the host^[2].

The Snyder test measures the time required for the Lactobacilli in the saliva test sample to produce a degree of acidity which causes a particular colour change of the indicator. Application of Snyder's test seems to be especially useful in the fields of orthodontics, in the preventive dentistry for children and in public health surveys.

2. Subjects and Methods

The study was conducted in the Nagpur city of Maharashtra state. The ethical clearance was obtained from institutional ethical committee before conducting the study and necessary permission was obtained from the Heads of the schools.

The sample size was calculated based on population size of preschool and school going children (age group 4 to 14 years) of city.

One hundred school children of 4-14 years age group were randomly selected. Informed consent was obtained from the parents of the children before conducting the study.

The clinical examination was carried out along with demographic profile, personal habits and oral hygiene practices. DMFT/DMFS index by Henry Klein, Carrole Palmer and Knuston 1938 and deft/defs index by Grubell 1948 was used to assess the caries status of the children [2]. The pH of the saliva was recorded using pH meter.

The saliva sample was collected by spitting method [3], the child was asked to rinse the mouth with distilled water. Immediately after rinsing the child was asked to chew a small piece of paraffin wax. The saliva that accumulated in following three minutes was collected in a sterile container. After vigorous shaking 0.2 CC of the sample was withdrawn into the pipette and then transferred into a melted medium of agar at 50° C. The medium had Bromocresol green as pH indicator. The inoculated medium was then incubated at 37° for a period up to 72 hours. The rate of colour change from blue-green to yellow is indicative of the degree of caries activity.

If yellow within 24 hours - Marked susceptibility to dental caries.

If yellow with 24-48 hours - Definite susceptibility to dental caries (moderate susceptibility)

If yellow within 48-72 hours - Limited susceptibility to dental caries (slight susceptibility)

No color changes - Caries inactive group.(negative susceptibility)

3. Results

The data was analysed using SPSS software.

Table 1 shows the distribution of children according to age groups and caries experience. The DMFT/ DMFS were found to be highly significant among the 12-14 years and deft/defs were found to be significant in 4-6 years of age group.

Table 2 shows the distribution of children according to average pH of saliva in the respective age groups. Of the total study subjects 18.2% subjects had pH of 4.1 to 5 and 2.7% had pH of 3 to 4. There was no significant difference noted with age and the pH of saliva.

Table 3 shows the distribution of children according to the caries experience and caries activity test (Snyder test).

The individuals showing marked change in colour after 24 hours, had significantly higher DMFT/ DMFS and deft/defs as compared to those individuals who showed no change in

colour. On further analysis after 48 hours, the caries experience was found to be more in individuals who showed a change in colour as compared to those individuals without any change in colour, After 72 hours, there was a significant difference in DMFT among the individual with limited change in colour as compared to no change in colour.

The distribution of children according to pH of saliva and Caries Activity test is shown in Table 4. Significantly more number of individuals (27.7%) with pH of 5.1 to 6 showed marked changes in colour after 24 hours. the number of individuals, who did not show any change in colour after 24 hours, was found to be statistically significant had the pH of 6.1 and above. Even at 48 hours this difference was found to be statistically significant.

At 72 hours, 12.8% children with pH 4.1 to 5 showed a limited change in colour. This showed that with decrease in pH of the saliva the children are more susceptible to dental caries. At pH above 6, children did not show any change in colour, demonstrating that as the pH of saliva is increased or towards normal the tendency towards dental caries decreases.

4. Discussion

The Snyder test measures the time required for the Lactobacilli in the saliva test sample, used to inoculate a suitable culture medium with a pH indicator, to produce a degree of acidity which causes a particular colour change of the indicator. This time is proportional to the initial number of Lactobacilli in the test sample [3]. this would help to identify high risk group individuals by assessing the change in colour in the patient's saliva sample. Then appropriate preventive and treatment measures for the individuals can be planned.

In this study caries was found to be in 89% of children. DMFT and DMFS was found to be significantly more in age group of 9-11 years and 12-14 and the dmft was found to be more in 4-6 years though it was not found to be statistically significant. The caries experience was found to be significantly more in the children who showed marked change in the colour in the first 24 hours. Also it was found that the decrease in pH (less than 6) was significantly more with marked changed in colour. This demonstrates that Lactobacilli counts are positively correlated with caries activity. Snyder and Clarke, Jullian J.H. and Fitzgerlad R.J.10 in their studies reported a close relation between Snyder test and lactobacillus count [4].

Snyder supports his test by proving it in 63 children and found it accurate for selecting caries active and caries negative cases as established by clinical examination. Cohen A H6 also observed a high degree of correlation between the Snyder's test and caries experience by DMFT index [5].

The calorimetric test was developed from an attempt to simplify the quantitative technique for ordinary clinical use. Its reflects the acid production of all the organisms of saliva inoculated in the selective carbohydrate medium of pH of 4.7-5.0 Acceptance of the colorimetric method for diagnosis of caries activity involves not only the practical consideration of simplicity, accuracy and economy but also the idea that acidogenic or aciduric organisms other than lactobacillus have some part in the process [5].

In both the studies the only correlation between the presence and number of aciduric or acidogenic bacteria in the saliva and caries activity was that which was found with lactobacillus and yeast [6]. Neither streptococci nor

staphylococci were isolated any more frequently in the caries active than caries negative cases.

Table 1: Proportion of study population according to age and dmft index

Age Grouping	DMFT/ DMFS <i>deft/defs</i>				Total
	0.00 to 0.10	0.11 to 0.50	0.51 to 1	1.1 to 1.5	
4 to 6 years	29 (19.6%)	30 (20.3%)**	1 (0.7%)	0 (0.0%)	60 (40.5%)
7 to 8 years	8 (5.4%)	13 (8.8%)*	3 (2.0%)	0 (0.0%)	24 (16.2%)
9 to 11 years	18 (12.2%)	15 (10.1%)*	8 (5.4%)**	1 (0.7%)	42 (28.4%)
12 to 14 years	14 (9.5%)	2 (1.4%)	6 (4.1%)**	0 (0.0%)	22 (14.9%)
Total	69 (46.6%)	60 (40.5%)	18 (12.2%)	1 (0.7%)	148 (100.0%)

**p<0.00 Highly Significant, *P<0.05 Significant

Table 2: Proportion of study population according to age and pH of saliva

Age Grouping	pH of saliva					Total
	3 to 4	4.1 to 5	5.1 to 6	6.1 to 7	7 and above	
4 to 6 years	1 (0.7%)	9 (6.1%)	15 (10.1%)	23 (15.5%)	12 (8.1%)	60 (40.5%)
7 to 8 years	1 (0.7%)	4 (2.7%)	12 (8.1%)	3 (2.0%)	4 (2.7%)	24 (16.2%)
9 to 11 years	1 (0.7%)	11 (7.4%)	14 (9.5%)	9 (6.1%)	7 (4.7%)	42 (28.4%)
12 to 14 years	1 (0.7%)	3 (2.0%)	11 (7.4%)	5 (3.4%)	2 (1.4%)	22 (14.9%)
Total	4 (2.7%)	27 (18.2%)	52 (35.1%)	40 (27.0%)	25 (16.9%)	148 (100.0%)

Table 3: Proportion of study population according to dmft and caries activity test (Snyder test)

DMFT/ DMFS <i>deft/defs</i>	Marked (After 24 hrs)		Definite (After 48 hrs)		Limited (After 72 hrs)	
	Changed	No Changed	Changed	No Changed	Changed	No changed
0.00 to 0.10	27 (18.2%)	42 (28.4%)	29 (19.6%)	40 (27.0%)	31 (20.9%)	38 (25.7%)
0.11 to 0.50	21 (14.2%)	39 (26.4%)	27 (18.2%)	33 (22.3%)	28 (18.9%)	32 (21.6%)
0.51 to 1	9 (6.1%)	9 (6.1%)	10 (6.8%)	8 (5.4%)	10 (6.8%)	8 (5.4%)
1.1 to 1.5	1 (0.7%)	0 (0.0%)	1 (0.7%)	0 (0.0%)	1 (0.7%)	0 (0.0%)
Total	58 (39.2%)	90 (60.8%)	67(45.3%)	81 (54.7%)	70 (47.3%)	78 (52.7%)

Table 4: Proportion of study population according to pH of saliva and caries activity test (Snyder test)

pH of saliva	Marked (After 24 hrs)		Definite (After 48 hrs)		Limited (After 72 hrs)	
	Changed	No Changed	Changed	No Changed	Changed	No changed
3 to 4	1 (0.7%)	3 (2.0%)	2 (1.4%)	2 (1.4%)	2 (1.4%)	2 (1.4%)
4.1 to 5	12 (8.1%)	15 (10.1%)	16 (10.8%)	11 (7.4%)	19 (12.8%)*	8 (5.4%)
5.1 to 6	41 (27.7%)**	11 (7.4%)	43 (29.1%)**	9 (6.1%)	43 (29.1%)**	9 (6.1%)
6.1 to 7	2 (1.4%)	38 (25.7%)**	4 (2.7%)	36 (24.3%)**	3 (2.0%)	37 (25.0%)**
7 and above	2 (1.4%)	23 (15.5%)**	2 (1.4%)	23 (15.5%)**	3 (2.0%)	22 (14.9%)**
Total	58 (39.2%)	90 (60.8%)	67 (45.3%)	81 (54.7%)	70 (47.3%)	78 (52.7%)

**p<0.00 Highly Significant, *P<0.05 Significant

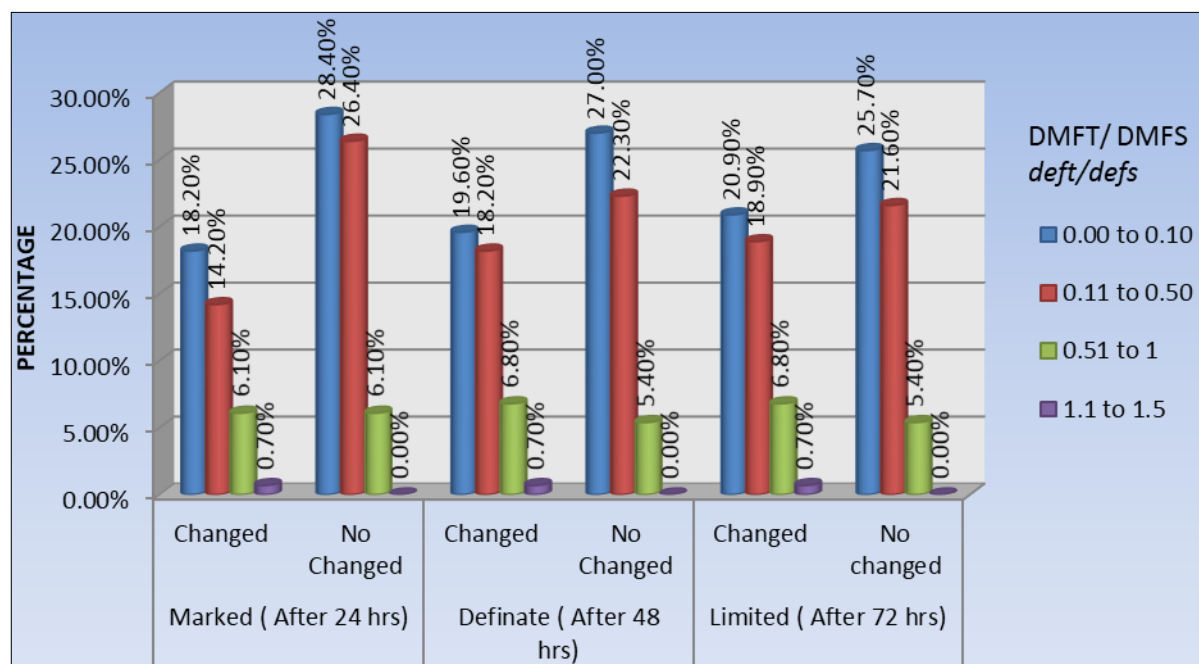


Fig 1: Proportion of study population according to DMFT and caries activity test (Snyder test)

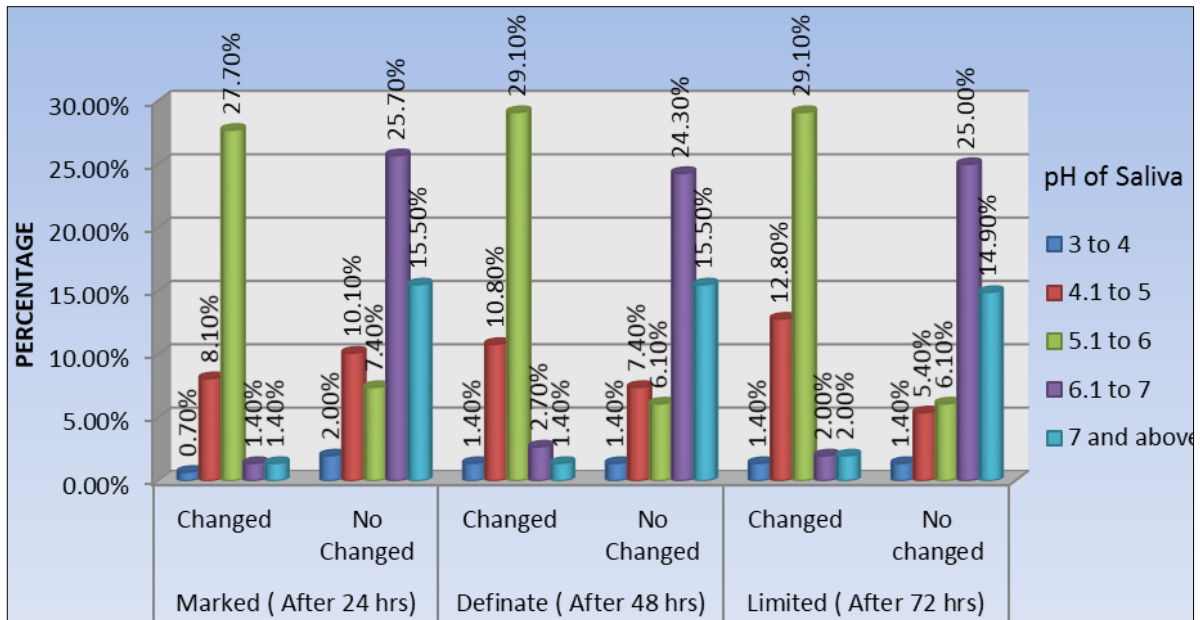


Fig 2: Proportion of study population according to pH of saliva and caries activity test (Snyder test)

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