Oratest: A Simple Chair Side Aid for Caries Risk Assessment

Ruchi Arora, Lahiri K Prathik, Masih Updesh

ABSTRACT

Background: A plethora of caries activity tests had been developed to predict susceptibility to caries. However, most of these tests either require an extensive armamentarium or they are not completely reliable. A reliable, inexpensive caries activity test for diagnosing high-risk patients, for patient motivation, and for preventive treatment planning is the need of the hour. Rosenberg et al in 1989 developed oratest, a simple, economical, non-invasive and less time consuming test for estimating the oral microbial level. Aims and Objectives: The present study relates plaque indices and DMFT counts as indicators of caries activity to oratest scores. Materials and Method: Sixty volunteers participated in the study. The children were asked to rinse their mouth vigorously for 30 seconds with 10 ml of ultra-high temperature sterilized cow’s milk containing 3% of fat. The expectorated was collected in a sterile beaker, and 3 ml was immediately transferred with a disposable syringe to a screw cap test tube, which contained 0.12 ml of 0.1% methylene blue. The expectorated milk and methylene blue was thoroughly mixed, and the test tube was placed on a stand in a well-illuminated area. A mirror was used to detect any color change [blue to white] in the bottom of the test tube every 5 minutes. The time taken for the initiation of the color change within 6mm ring was recorded. Results: The time taken for color change in control group, was 145–190 min and was 45 – 90 min for the test group. Conclusion: the study concludes that higher the level of infection, lesser was the time taken for a change in color of expectorate, reflecting higher oral microbial levels.

Key words: Caries activity; Dental caries; Oratest

Introduction

The growing interest in the microbiological aspects of dental caries has led to the development of a variety of diagnostic procedures. A number of caries activity tests have been developed to detect the presence of oral conditions associated with increased caries risk. For individual patients, currently no single caries activity test can be relied upon to predict caries with a high degree of confidence as many of these tests rely on the samples of salivary bacteria. The reliability of such tests is limited, because the bacteria that are free-floating in the saliva may not necessarily represent the bacteria in plaque. These tests also need extensive working time and expensive armamentarium.1

Individual caries activity tests, despite their limitations, can be useful adjuncts to the clinical practitioner, by guiding the clinician in making decisions concerning the need for control measures, the timing of recall appointments, the types of indicated restorative procedures, materials and the determination of the prognosis. The test results can also be used to motivate patients and to determine patient compliance with treatment regimes. A simple, inexpensive technique, which does not demand sophisticated skills or consume less chair side time will help to give the caries activity, tests the status they deserve in routine clinical practice.

A large body of evidence supports the hypothesis that microorganisms present in dental plaque constitute the primary etiological factor in periodontal diseases.2-4 It has similarly been established that dental plaque accumulation induces and promotes gingivitis.5 Prior to the 1970s, periodontal diseases were ascribed to the overall increase in microorganisms, a concept referred to as the “non-specific plaque hypothesis.” More recently, specific groups of bacteria were found to be associated with particular periodontal ailments, leading to a “specific plaque hypothesis.”5 In 1985, Moore et al.7 reported that periodontal diseases are associated with elevated levels of at least 57 bacterial species. The observation that many suspected periodontal pathogens require or prefer anaerobic growth conditions has led to speculation that oxygen depletion by aerobic plaque microorganisms is a prerequisite for the development and progression of periodontal diseases.8

Rosenberg and coworkers4 reported a simple, non-invasive technique (the oratest) which estimates oral microbial levels, based on the rate of oxygen depletion in expectorated milk samples. The test is performed by rinsing the mouth with sterilized milk. A sample of expectorate is then added to a test tube containing the redox indicator, methylene blue. The time required for anaerobic conditions to be attained at the bottom of the tube, as indicated by a blue-to-white color change, is recorded. In a previous investigation, strong correlations were observed between oratest scores and counts of aerobic and aerotolerant microorganisms.9 The present study was undertaken to compare oratest scores with commonly used indices for clinical evaluation of plaque levels and DMFT.

Materials and Method

Principle: Oratest is based on the rate of oxygen depletion by microorganisms. Under aerobic conditions the bacterial enzyme; aerobic dehydrogenase transfers electrons or protons to oxygen. Once oxygen gets utilized by the aerobic organisms and an anaerobic environment is attained, methylene blue [redox indicator] acts as an electron acceptor and gets reduced to leukomethylene blue. The metabolic activity of the aerobic microorganism is reflected by the reduction of methylene blue to leukomethylene blue.

The test is based on rinsing the mouth with sterile milk that dislodges the micro-organisms and also produces a substrate for their further metabolism. The formation of leukomethylene blue can be easily observed because of the white color of milk.
Armmamentarium

- Sterilized milk
- 0.1% aqueous solution of methylene blue.
- Sterile beakers
- Screw cap test tubes.
- 5ml disposable syringes
- Sterile pipettes
- Mirror
- Test tube stand.
- Water.

Procedure: Sixty volunteers (mean age 12 years) participated in the study. The plaque level and the number of decayed, missing, filled teeth of each volunteer were scored using the Loe and Silness (1967) and DMFT indices respectively. The children were asked to rinse their mouth vigorously for 30 seconds with 10 ml of ultra-high temperature sterilized cow’s milk containing 3% of fat. The expectorator was collected in a sterile beaker, and 3 ml was immediately transferred with a disposable syringe to a screw cap test tube, which contained 0.12 ml of 0.1% methylene blue. (0.1% methylene blue was obtained by mixing 100 mg of methylene blue in 100 ml of distilled water) The expectorated milk and methylene blue was thoroughly mixed, and the test tube was placed on a stand in a well-illuminated area. A mirror was used to detect any color change [blue to white] in the bottom of the test tube every 5 minutes. The time taken for the initiation of the color change within 6mm ring was recorded.

Results

In the present study, 60 children were randomly selected from the Department of Pedodontics for the oratest. It was noted that the correlations were slightly altered by drinking or eating prior to the test. Thus all subjects in the study were taken only after a lapse of 90 minutes since the last intake of food or drink. The test was based on whole mouth rinsing with sterile milk, which is a suitable vehicle as it dislodges microorganisms mildly yet effectively. It is nontoxic, provides an excellent medium for subsequent metabolism and also readily acceptable by the children. Expectorate was then added with the methylene blue and the time taken for initiation of color change was noted.

The time taken for color change of methylene blue was compared with the deft/DMFT values and plaque index scores. For the control group, the time taken for color change was 145-190 min and was 45 – 90 min for the test group. These findings were in agreement with the findings of Patalay et al.10 Anand et al.11 who performed oratest on 50 children. They found the mean time taken for the color change was 279.9 min ± 89.74 in the control group and 55.6 min ± 66.33 for the test group. The difference between the two groups was highly significant.

In the present study maximum time taken for color change [90-130 min] was observed in children with 1-3 carious teeth and the minimum time taken for the color change [45-80 min] was in children with 6 or more carious lesions. Similar findings were reported by Patalay et al.10 and Anand et al.11 In the present study, when all 60 subjects were grouped together, significant co-relation was found between time required for color change and plaque index. Tal Haim and Rosenberg Mel12 observed similar results when they compared oratest scores with commonly used techniques for clinical evaluation of plaque levels and gingival inflammation. They also reported that higher the oratest scores, lower the value of plaque index [y =0.58, P=0.001].

Discussion

As the oratest, gives positive observations in cases of gingival diseases, periodontal diseases, halitosis, etc., its limitation is the lack of specificity, as it does not identify the source of microorganisms. The test can be easily learnt by the auxiliary personnel and hence can be used as a diagnostic tool in school health programs. The positive results can easily be visualized by the practitioner, child and the parent and thus can be used to motivate.13 As it does not require any special instruments, it can be used to monitor treatment progress. It can provide a baseline with which subsequent changes in clinical status and oral hygiene [i.e., following oral prophylaxis] can be monitored in a chair side or even home environment.

The present study, thus further proved the hypothesis that higher the level of infection, lesser was the time taken for a change in color of expectorate, reflecting higher oral microbial levels. Thus, the test can be used as one of the tools, to estimate the activity of demineralization by the bacteria conducive to the suitable environment.

Oratest, a simple chair side caries activity test provides a reliable estimate of oral microbial levels. Significant overall correlations were observed between oratest data and deft/DMFT or plaque index.

Conclusion

A caries activity test facilitates the clinical management of patients as they determine the need and extent of personalized preventive measures. It serves as an index for the success of therapeutic measures and also help and to motivate and monitor the effectiveness of educational programs relating to dietary and oral hygiene procedures. It is of particular importance in identifying high-risk groups and individuals.
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References

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