Comparison of the Prevalence of Dental Caries in Children Using Two Caries Detection Methods

Ankita Warkhankar, BDS[1] - Jorge H. Caceda, DDS,MPH,MS, PhD[1] - Shuying Jiang, MS[1]

[1]Rutgers School of Dental Medicine, Department of Pediatric Dentistry & Community Health, Newark, New Jersey

Universidad Peruana Cayetano Heredia, Department of Community Dentistry, Lima, Peru

Abstract

The determination of the prevalence of dental caries is one of the most effective methods used to identify high risk groups and to control the disease[1].

Epidemiological studies have shown that dental caries remain one of the most common chronic diseases affecting children globally.[2] The implications of dental caries can greatly affect the quality of life, and many have sought out their causes and associated risk factors.

The detection of dental caries may vary depending on the method used. For example, visual examination depends on the dentist's expertise and calibration and may be prone to bias. For these reasons, a caries detection method with high accuracy, sensitivity and specificity is important to determine the prevalence of dental caries and the severity of the disease differentiating between populations with high and low risk to develop dental caries.

In the past two decades non-invasive light fluorescent methods (LFM) which are based on the optical changes on surface of the tooth have been recommended for the detection of dental caries. The Quantitative Light-induced Fluorescence (QLF), DIAGNOdent (DD), Fiber-optic Trans illumination (FOTI), and Spectra™ light fluorescence system (**SLFS)** (Air Techniques, Inc. Melville, NY, USA), among others, belong to this category and have been studied widely.[3,4,5]

The purpose of this study was to compare the prevalence of occlusal caries in primary and first permanent molars in children 7-12 using the visual method **(VM)** and the SLFS.

Materials & Methods

The primary and first permanent molars of 160 children, ages 7 to 12 years were examined to detect occlusal caries. Written informed consent and assent describing the purpose, risks, and benefits of the study were obtained from legal guardians and children respectively. All examinations were performed by a single calibrated dentist with an intra-examiner reliability of Kappa = 0.90. All data was transferred to Excel using the EpiInfo™ software (CDC.org).The exclusion criteria of the study included children who could not participate due to behavior or medical conditions, and those who couldn't tolerate the caries detection examination. Before the examinations were conducted, all teeth were cleaned using a disposable toothbrush and dried using a 2x2 piece of gauze. An intra-oral mirror was used with natural and artificial light. All subjects were given an identification code to avoid bias related to name, age, and gender.

The caries detection in enamel and dentin was performed using the ICDAS (International Caries Detection and Assessment System). Code 0: sound tooth surface, Codes 1 to 3 were combined to represent caries in enamel and codes 4 to 6 were combined to represent caries in dentin.

The detection of occlusal caries with the SLFS was performed using a 10mm black plastic separator. This separator avoided the penetration of external light sources and allowed for the same distance between the lens of the camera and the occlusal surface, preventing distortions of the image. All images were transferred to the Visix® (Air Technique, Inc., Melville, NY) dental imaging processor, and stored in a file generated by the program for further interpretation and analysis. The criteria established for the detection of occlusal carious lesions using the SLFS system was based on the manufacturer's recommendations. The prevalence of caries was determined considering the following criteria: 1. Any caries (caries in enamel or dentine), 2. Caries in enamel only, and 3. Caries in dentine only.

Figures

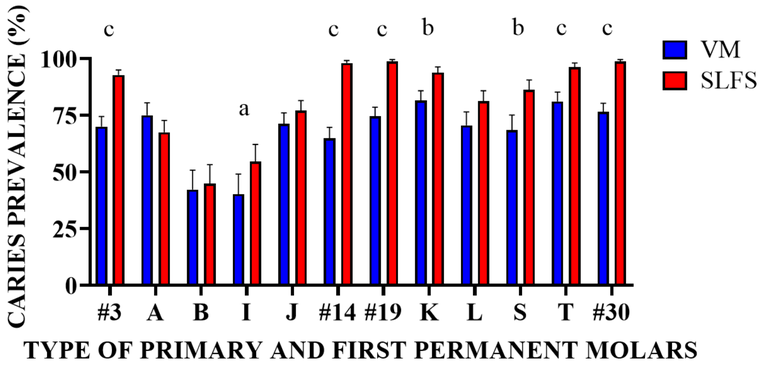

Figure 1. Comparison of the prevalence of any caries between VM and SLFS according to the type of tooth examined
a: P>0.05
b: P=0.02,
c: P<0.05

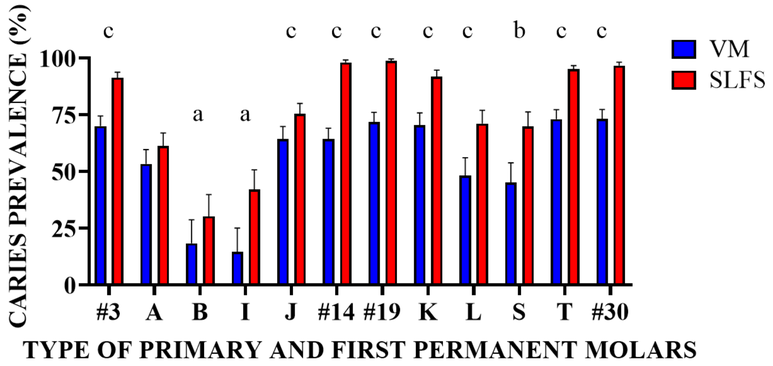

Figure 2. Comparison of the prevalence of caries in enamel between VM and SLFS according to the type of tooth examined
a: P=0.4,
b: P= 0.0.15
c: P<0.05

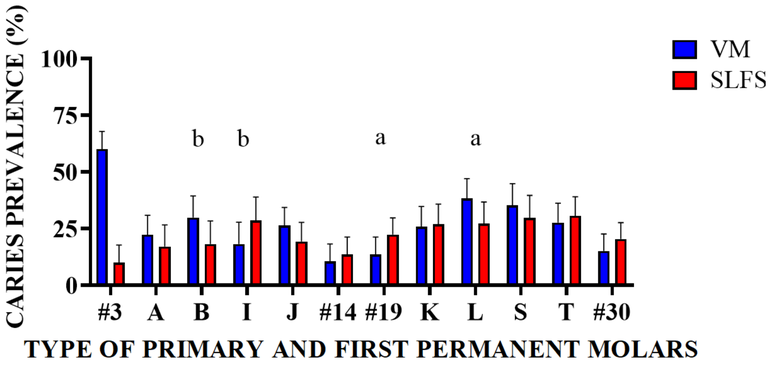

Figure 3. Comparison of the prevalence of caries in dentin between VM and SLFS according to the type of tooth examined
a: P=0.4,
b: P= 0.0.15
c: P<0.05

Results

The analysis showed that there was a significant difference in the prevalence of dental caries using SLFS and VM.

- Prevalence of dental caries for any caries was found to be higher using SLFS as compared to VM.
- Prevalence of dental caries in enamel also showed higher prevalence of caries using SLFS as compared to VM .
- Prevalence of dental caries in dentin did not show statistically significant differences using SLFS and VM.
- The statistical analysis showed that the prevalence of dental caries was quite symmetrical in both dental arches.
- The prevalence of dental caries appears to be higher in the first permanent molars using both SLFS and VM.
- In primary molars the prevalence of caries appears to be higher in the second primary molars when compared to the first primary molars.

Conclusions

- The prevalence of caries changes according to:
  1. The caries detection method used.
  2. The type of teeth examined.
  3. Whether the carious lesion is compromising the enamel or dentine.
- The selection of a caries detection method appears to be an important factor to identify children at risk to develop caries at its early stages, which may allow the early implementation of preventive dental treatment avoiding costly reparative treatments.

Acknowledgements

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