Reviewer's report

Title: Comparison of photographic and visual assessment of occlusal caries with a histological gold standard

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Reviewer: Michele Diniz

Reviewer's report:

General Considerations:
- In general, the present manuscript is an interesting paper considering the evaluation of photographic compared to the visual assessment of occlusal caries. However, some points have to be added and/or clarified.

- It should be clear the difference between “diagnosis” and “detection”. The authors used both terms with no criterion (See paper published by Nyvad, Caries Research 2004; 38:192-198).

- Methodology should be better described.

- Limitations of the investigation should be presented in the text.

Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore):

Title:

- I would recommend changing the title to “Comparison of intra-oral photographs and visual assessment of occlusal caries with a histological gold standard”

Abstract:

- Last sentence in the conclusions should be excluded “It is therefore worth exploring further the use of intra-oral photographs in epidemiological studies”, since it does not match the aim.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct):

Abstract:

- Background: “The purpose of this study was to compare diagnostic performance for the detection….” should be changed to “The purpose of this in vitro study was to compare the performance of intra-oral photographs with an established visual examination method for the detection of occlusal caries using the histological analysis as gold standard.”

- Methods: “methods diagnoses” should be changed to “detection methods”

- Methods: “diagnostic decisions” should be changed to “caries detection decisions”
Define level “caries into dentine”

-Intra and interexaminer reproducibility values should be presented in the results

Background:

-Again it should be clear the difference between “diagnosis” and “detection”. The authors used both terms with no criterion, i. e.:

-First paragraph: “This has led to proliferation of literature about how best to diagnose or detect dental caries in various settings [1]” should be replaced by “This has led to proliferation of literature about how best to detect dental caries in various settings [1]”. “The most common and traditional method of detecting and diagnosing dental caries is by a visual inspection of the tooth surfaces” should be replaced by “The most common and traditional method of detecting caries lesions is by a visual inspection of the tooth surfaces”.

-Last paragraph: “There are however very few studies in the literature that have investigated the use of intra oral images and caries diagnosis” should be replaced by “However, there are very few studies in the literature that have investigated the use of intra oral images and caries detection”.

Aims:

-“The purpose of this study was to compare diagnostic performance for the detection…..” should be changed to “The purpose of this in vitro study was to compare the performance of intra-oral photographs with an established visual examination method for the detection of occlusal caries using the histological analysis as gold standard.”

- Hypothese 5: “There is a significant difference in recorded dental caries…..” should be changed to “There is a significant difference in recorded dental caries between the visual and the intra-oral photographs assessments compared to the histological analysis for detecting caries at “caries into dentine” level”.

Results:

-First paragraph: The frequency distribution of the codes/scores allocation of the teeth according to the examination type should be described in the text instead of presenting in Table 1. Table 1 should be replaced by a table containing cross-tabulation (methods x histology)

-First paragraph: “Table 2 summaries the intra examiner…..” Should appear as another paragraph. Besides, second paragraph should be continuous to this information.

-Last paragraph: Present accuracy values and McNemar test in Table 3. Area under the ROC values (with 95% Confidence Interval) should also be presented in Table 3.

Discussion:

-Discussion section would be improved after application of a statistical test to compare the performance values (sensitivity, specificity, accuracy) between both methods.
-Second paragraph: “In this study caries was only diagnosed...” should be changed to “In this study caries was only detected....”

-Third paragraph: Be careful when using the term “external validity”. External validity is the validity of generalized inferences in scientific studies, if they may be generalized from the unique and idiosyncratic settings, procedures and participants to other populations and conditions. The most common loss of external validity comes from the fact that experiments using human participants often employ small samples obtained from a single geographic location or with idiosyncratic features (volunteers). Please, correct the sentence.

-Third paragraph - last sentence: “Also weighted kappa rather than non-weighted kappa values...” should be better presented in the “Data Processing and Analysis” section.

-Sixth paragraph: The sentence “The two methods however had the same specificity (82.4%) which was high. The photographic assessment....” is similar to the sentence presented in the first paragraph of the discussion section. The information is repetitive.

Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached):

Methods:
-Second paragraph:
  --What kind of teeth was used? Permanent or primary teeth? Pre molars and molars? How many molars (xx) and premolars (yy) were used in the study? Please, add this information separately. Were the molars third, second and first molars? Give details.
  --Inclusion and exclusion criteria of the teeth should be better described in the text. Exclusion criteria, i.e., teeth with restorations or sealants, caries on approximal surfaces, fluorosis, hypoplasia
  --Were the teeth stored in some solution? i.e., distilled water, thymol solution, formaldehyde solution, saline solution. This information only appears in the “Visual Examination” section. It’s not clear if the teeth were placed in water only for the visual examination or if they were stored in water during all investigation.
  --“Fifty the extracted teeth some sound and others with carious lesions of various degrees of severity were used for this study” should be changed to “Fifty extracted permanent teeth varying from sound to different carious lesions degrees of severity were used for this study”
  --Were the teeth submitted to a prophylaxis procedure? What kind?
  --BASCD codes and Figure 1 should be presented in details in the “Visual Examination” section. BASCD does not consider incipient caries lesions, i.e., active white spot lesion. Considering that the authors used teeth varying from sound to different carious lesions degrees of severity, how those types of lesions were classified according to the criteria? How can you classify in an in vitro condition a tooth as “arrested caries”? Describe this code in details according to
BASCD criteria.

--Figure 1: What is the difference between the first photograph presented as “coded as caries into dentine” and the second photograph presented as “coded as caries into pulp”? Both surfaces are cavitated into dentine. What are the clinical parameters to differentiate the cavitation extension?

--The information of the examiners should be presented in the beginning of the “Methods” section instead of appearing only in the “Visual Examination” section. Were the nine examiners trained or calibrated? There is a huge difference in training and calibration. If the examiners were calibrated, please, add details of the calibration procedure and the kappa statistics for that.

-Visual Examination:

--Second paragraph: “Caries was diagnosed visually at the “caries into dentine” level” should be changed to “Caries was visually detected at the “caries into dentine” level”. Define “caries into dentine level”: sound teeth was considered as “sound”; and arrested caries, caries into dentine and caries extending into the pulp were considered “carious”. This information only appears in the “Data Processing and Analysis” section.

--Second paragraph: Why the second examination was conducted 1 hour after the first one? Most of the studies use a one-week interval. Examiners could memorize some teeth and this could influence the results.

-Photographic Procedure and Assessment:

--Who did the photograph of each tooth? Was a trained or a calibrated examiner?

--It would be interesting presenting a figure showing this procedure of the study.

--What was the magnification used during photographs capturing?

--Explain how the photographs were standardized.

--Second paragraph: “Caries was diagnosed at the “caries into dentine” level” should be changed to “Caries was detected at the “caries into dentine” level”.

--Third paragraph: Please, comment the possibility of the examiner manipulates the image presented on a CD ROM during analysis.

--Third paragraph: How was defined the second examination with a minimum of 14 days after the first viewing?

-Histological Assessment:

--Second paragraph: The histological assessment was conducted on two separate occasions? What was the interval between both examinations? In case of differences between the first and second examination, how the consensus was reached?

--Second paragraph: Please, add reference regarding the histological scores used for caries extension. How was differentiate caries into inner dentine and caries into pulp?

-Data Processing and Analysis:
Second paragraph: Considering the histological scores for the statistical analysis, which data (first or second) was used to calculate sensitivity and specificity values?

Second paragraph: ROC analysis (area under the ROC curve) and accuracy values should also be calculated.

Second paragraph: McNemar test (p<0.05) should be calculated in order to compare the performance of the two methods (sensitivity, specificity and accuracy values).

Second paragraph: “caries into dentine level”: sound teeth was considered as “sound”; and arrested caries, caries into dentine and caries extending into the pulp were considered “carious”. How arrested lesions can be considered as carious in dentine level?

Discussion:

Seventh paragraph: It is important to discuss other points, such as, how long it would take for getting intra-oral photographs in an epidemiological study? Does the examination of the photographs would take more or less time when compared to the visual inspection?

Eighth paragraph: To allow true comparative public health studies, how the photographs could be standardized from different patients?

The limitations of the present investigation should be stated, such as the small number of teeth (n=50), in vitro conditions of the examinations, less time and facility for taking intra-oral photographs of extracted teeth, which would be different when considering an in vivo situation.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.