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Assessment of different methods for diagnosing dental caries in epidemiological surveys

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Abstract – Aims: The aims of the study were: (i) to assess different clinical diagnostic methods of dental caries during epidemiological surveys; (ii) to determine which combinations of methods and diagnostic adjuncts show the best performances in epidemiological surveys when compared with examinations performed in a traditional dental setting (standard); (iii) to evaluate the influence of including noncavitated (NC) lesions in dental caries estimation. *Methods:* Forty 12-year-old children were divided into low and moderate caries prevalence groups. The individuals were submitted to 12 epidemiological examinations (in an outdoor setting), which combined three methods (blade, mirror and mirror + CPI (Community Periodontal Index) dental probe) with or without diagnostic adjuncts (previous dental brushing and dental drying). The last examination was performed in a traditional dental setting (standard examination). The unit of measure was the DMFS (decayed, missing and filled surfaces) index according to WHO criteria. The variance analysis, Dunnet's and Tukey's tests were applied. *Results:* For the DMFS analysis, the visual/tactile method, with or without diagnostic adjuncts, was the best method for both groups, presenting a performance higher than 90% when compared with the standard examination, except for the examinations without previous dental brushing for the low caries prevalence group. Previous dental brushing was more relevant than dental drying ($P = 0.0054$). All of the epidemiological examinations underestimated the NC diagnosis even with the association of diagnostic adjuncts when compared with the standard examination. *Conclusion:* The visual–tactile (for both groups) and the visual (mirror) methods plus dental brushing (for the moderate group) are appropriate for diagnosing cavitated lesions, but not NC lesions.

Key words: dental caries; diagnosis; epidemiology

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Introduction

Epidemiological surveys are very important for gaining knowledge about the diseases in a population. Such data is frequently used to inform health care plans, monitor service delivery and track disease trends (1, 2).

In the literature, some studies have been published regarding examination methods for dental caries, which, when used in epidemiological surveys, can help to determine the correct diagnosis and the most suitable treatment. Some comparative studies of epidemiological examinations employ different combinations of diagnostic adjuncts (previous dental brushing and drying) with the same or with different diagnosis criteria from that employed by the World Health Organization (WHO) (3–8). Generally, the results of these studies showed that a more complete examination method, mainly with the employment of dental brushing, drying and under artificial light, is able to diagnose carious lesions more efficiently than the method which does not use those kinds of adjuncts. However, it is interesting to note that no studies

compare different methods and diagnostic adjuncts for the estimate of the noncavitated lesions (NC – noncavitated enamel caries or initial lesions).

Unlike some methodologies, which generally use the visual method with diagnostic adjuncts under artificial light (9–13), the epidemiological examination according to the WHO (1) is recommended to be performed under natural light, with a mirror and a CPI dental probe (visual–tactile method). Some studies have shown that different light sources can also contribute to the detection of dental caries in epidemiological surveys (3, 7, 14, 15).

Researchers have questioned the need to introduce modifications in diagnosis criteria for dental caries, mainly under epidemiological conditions. The justification is based on observations of the significant changes in the manifestation of the disease in the last decades, such as reduction in the prevalence of caries and decreases in the progressive speed of the lesion (16–18). Recent epidemiological research has shown that NC lesions have been more prevalent than cavitated dentin lesions (2, 9, 19). Therefore, it can be affirmed that the real conditions of the disease in the population have been underestimated, and this can consequently generate an inadequate implementation of therapeutic noninvasive measures to control the progression of the disease (10, 11). Therefore, maintaining the same examination methodology will not provide a significant measure of the disease trends (11, 13).

Thus, the objectives of the present study were: (i) to assess different clinical diagnosis methods of dental caries during epidemiological surveys; (ii) to determine which combinations of methods and diagnostic adjuncts show the best performances in epidemiological examinations, compared to a traditional dental setting examination; (iii) to evaluate the influence of including NC lesions in dental caries estimation.

Materials and methods

The project was first approved by the Ethical Committee in Research at the Piracicaba Dentistry School/UNICAMP (State University of Campinas) in agreement with Resolution 196/96 from the National Committee of Health/Health Department (BZ). The schools granted permission for the study and informed consent was obtained from the parents.

Sample

The number of repetitions was calculated through ANOVA (power, 0.99) at a significance level of 0.05.

There was a previous selection process in an outdoor setting (school playground) by an examiner who did not participate in the experimental phase. The examiner employed a dental mirror, a CPI probe and previous dental brushing and drying for the examinations. The codes and criteria used were based on the WHO recommendations (1). Children having local or general problems, such as the use of a fixed orthodontic device, severe fluorosis and hypoplasia, or a serious systemic disease were excluded from the study.

First, 44 12-year-old children enrolled in a public school in the city of Piracicaba-SP were selected. Four individuals left the study because of their being transferred to other schools, resulting in a total of 20 individuals per group at the end of the experiment. These two groups were selected according to the WHO (20) caries prevalence criteria – (DMFT index: decayed, missing, filled teeth) (14): G1, low prevalence (DMFT: ≤ 2.6); G2, moderate prevalence (DMFT: 2.7–4.4) of dental caries.

Examiner calibration

In the present study, a benchmark examiner and only one additional examiner performed the calibration process for the dental caries examination. The benchmark examiner (dentist who routinely uses the WHO criteria for examinations (1)) had been previously trained and calibrated in the diagnosis of NC carious lesions and had examined using these criteria in other studies (2, 7). Theoretical discussions using clinical photographic slides to provide visual examples of each criterion were held to instruct the examiner on the use of the criteria and the examination method, including explanations about the examinations for active NC carious lesions. After this, clinical training sessions were held, followed by the calibration. The epidemiological examinations were performed in an outdoor setting under natural light. During a separate period, clinical examinations were carried out in a traditional dental setting under artificial light. The entire time spent on the calibration process (theoretical discussions, training and calibration exercises) was 40 h. Inter-examiner agreement (benchmark versus experimental phase examiner) was calculated through kappa statistics. Kappa values of 0.91 (DMFS)/0.80 (NC) and 0.95

(DMFS)/0.84 (NC) were obtained for the epidemiological examinations and for the examination performed in a traditional dental setting, respectively.

Study design

All examinations were performed only by the previously calibrated examiner. The benchmark examiner did not participate in the experimental phase.

The groups were submitted to 12 epidemiological examinations and a 13th clinical examination performed in a traditional dental setting (standard examination). The epidemiological examinations employed a combination of methods: (a) dental mirror + CPI dental probe (visual/tactile); (b) mirror (visual); and (c) blade (tongue spatula) – with or without diagnostic adjuncts (previous dental brushing and/or dental drying) (Table 1).

The epidemiological clinical examinations were performed in a school yard under natural illumination.

The CPI probe was employed for caries diagnosis without applying pressure on dental surfaces in order to clarify doubts regarding visual diagnosis and also to aid the removal of dental biofilm.

Previous dental brushing was performed according to the modified Bass technique with fluoridated dentifrice exactly 2 min. After brushing, the individuals were submitted to the examination. It is important to point out that oral hygiene instruction was given only on the days that brushing was employed as a diagnostic adjunct.

Previous dental drying in an outdoor setting was carried out with the use of compressed air through a portable dental unit (Proquest Delivery System, model 4010; Compressor Technologies Ltd, Englewood, CO, USA) for about 3–5 s per tooth.

The examination sequence was programmed according to the complexity level of the examinations: without previous dental brushing, without previous dental drying (no.: 1, 5 and 9); without previous dental brushing, with previous dental drying (no.: 2, 6 and 10); with previous dental brushing, without previous dental drying (no.: 3, 7 and 11); and, finally, the examinations with previous dental brushing, with previous dental drying (no.: 4, 8 and 12) (Table 1). However, for each respective kind of examination, the examiner followed different sequences of examining children by random draw conducted by the dental nurse.

After all of the epidemiological examinations were done, the 13th examination was performed in a traditional dental setting under artificial light and with the use of a dental mirror and a CPI dental probe. It was preceded by dental prophylaxis and previous dental drying using compressed air.

A minimum interval of 10 days between each examination was allowed to avoid possible memorization by the examiner of the clinical conditions and also to avoid volunteer fatigue.

Re-examinations were performed in 10% of the sample for each epidemiological and clinical examination. Kappa statistics were employed to determine intra-examiner error. Medium values of kappa were 0.85 (DMFS)/0.70 (NC) and 0.91 (DMFS)/0.72 (NC) for the epidemiological examinations and for the examination performed in a traditional dental setting, respectively.

Table 1. Epidemiological examinations performed in an outdoor setting and examination performed in a traditional dental setting: Piracicaba, SP, Brazil, 2004

Method	Diagnostic adjuncts	Number of the examination
Blade	Without dental brushing or dental drying	1
	Without dental brushing, with dental drying	2
	With dental brushing, without dental drying	3
	With dental brushing, with dental drying	4
Mirror	Without dental brushing or dental drying	5
	Without dental brushing, with dental drying	6
	With dental brushing, without dental drying	7
	With dental brushing, with dental drying	8
Mirror + explorer	Without dental brushing or dental drying	9
	Without dental brushing, with dental drying	10
	With dental brushing, without dental drying	11
	With dental brushing, with dental drying	12
Mirror + explorer (performed in a traditional dental setting)	With dental brushing, with dental drying	13

Main outcome measures

For better data analysis, the unit of measure used for verification of dental caries was DMFS. The criteria and codes (for both epidemiological and dental setting examinations) were those based on the WHO recommendations (1). For the NC carious lesions, only active caries with intact surfaces were recorded (an adaptation of the criteria according to Nyvad et al. (12); Fyffe et al. (13)). Thus, an NC carious lesion was defined as active caries which, through visual assessment by a calibrated examiner, indicated an intact surface, no clinically detectable loss of dental tissue, with a whitish/yellowish coloured area of increased opacity, rough, with loss of lustre and presumed to be carious (when the probe is employed its tip should be moved gently across the surface). *Smooth surface*: caries lesion typically located close to gingival margin. *Fissure/pit*: intact fissure morphology: lesion extending along the walls of the fissure.

Statistical analysis

An exploratory analysis of the data before the statistical analysis was applied. For this, the Proc Lab (SAS, Cary, NC, USA), indicating a normal distribution and an homogeneous variance.

For the comparison of the 13th dental caries examinations, a three-way ANOVA was employed with $(2 \times 2 \times 3)$ treatment (brushing × drying × methods) with the standard dental setting serving as an additional treatment in order to establish whether the averages were statistically different or not. The Tukey's test was used to make comparisons among the main factors – brushing, drying and method – and for the interactions. The Dunnett's test was employed to make comparisons with the standard (traditional dental setting). A descriptive analysis was also made in order to present the results of the epidemiological examinations in percentages when compared to the examination performed in a traditional dental setting for both variables, DMFS and NC.

Results

The analysis of each table for the DMFS (WHO criteria – caries being considered a cavitated lesion) and NC variables of the two prevalence groups was carried out in three ways: first, horizontal analysis to compare blade, visual (dental mirror) and visual/tactile (dental mirror + CPI dental explorer) methods under the same respective combinations of diagnostic adjuncts (previous dental brushing and drying); secondly, vertical pair analysis to verify the effect of dental drying and brushing; and thirdly, comparative analysis of the epidemiological examination averages in relation to the average obtained in the dental setting examinations.

In relation to the DMFS variables for both prevalence groups, the means were significantly different among the visual/tactile, visual and blade methods, according to each respective combination of the diagnostic adjuncts (horizontal analysis) ($P < 0.0001$) The mean values of the examinations with brushing were significantly greater when compared with those without brushing ($P = 0.0054$). Furthermore, epidemiological examinations with dental drying did not present statistical differences when compared with those examinations without drying (for the low prevalence group) ($P = 0.1953$), while this adjunct was important for the moderate prevalence group (vertical pair analysis) ($P = 0.0362$). The visual/tactile method with or without adjuncts (for both groups) and the visual method with brushing (for the moderate prevalence groups) did not present significant differences when compared with the examination performed in the clinical setting ($P > 0.05$). These same methods showed performances above 90%, when compared with the traditional dental setting examination, with the exception of the visual/tactile method without brushing for the low prevalence group (no. 9, 10) (Tables 2, 3 and 5).

In relation to the NC variable, significant differences were not found among the visual (blade and dental mirror) and visual/tactile methods, when submitted to the same combination of diagnostic adjuncts (horizontal analysis) ($P = 0.4832$). In general, examinations with previous dental brushing showed significantly higher averages than those examinations without brushing (for the low prevalence group) ($P = 0.0357$). However, this adjunct was not important for improving the diagnosis for the moderate prevalence group ($P = 0.3628$) (vertical pair analysis). All of the epidemiological examinations showed significant differences when compared to the standard clinical examination ($P < 0.05$), demonstrating variability in diagnosis of 9.76–75.51%. The best performances (in percentage) were found by the methods associated with

Table 2. DMFS and NC lesion mean and perceptual values of epidemiological examinations compared with a traditional dental setting examination (standard) for low and moderate dental caries prevalence: Piracicaba, SP, Brazil, 2004

	Low prevalence		Moderate prevalence	
Examinations	DMFS (%)	NC (%)	DMFS (%)	NC (%)
1	0.882 (40.53)	0.471 (09.76)	3.435 (71.18)	0.696 (14.55)
2	1.176 (54.04)	2.471 (57.68)	3.739 (77.48)	2.739 (40.89)
3	1.118 (51.38)	1.235 (25.60)	3.956 (81.97)	1.956 (40.90)
4	1.294 (59.47)	2.882 (59.74)	4.087 (84.68)	3.435 (71.82)
5	1.353 (62.17)	1.353 (31.58)	3.913 (81.08)	1.913 (39.99)
6	1.353 (62.17)	2.294 (47.55)	4.174 (86.48)	3.174 (66.36)
7	1.471 (67.60)	1.529 (31.70)	4.435 (91.90)	1.739 (36.36)
8	1.529 (70.27)	2.882 (59.74)	4.565 (94.59)	2.913 (60.90)
9 (WHO)	1.588 (71.17)	1.353 (31.58)	4.522 (93.70)	1.609 (33.64)
10	1.647 (75.68)	2.647 (61.79)	4.652 (96.39)	3.261 (68.18)
11	2.000 (91.91)	1.235 (25.60)	4.696 (97.31)	1.391 (29.08)
12	2.118 (97.33)	3.235 (75.51)	4.783 (99.10)	2.826 (59.08)
13	2.176 (100.00)	4.824 (100.00)	4.826 (100.00)	4.783 (100.00)

Table 3. DMFS values of epidemiological examinations according to the association or not of previous dental drying and brushing and in comparison with mean values of the examinations performed in a traditional dental setting in relation to the low dental caries prevalence group: Piracicaba, SP, Brazil, 2004

		DMFS (SD)		
Drying	Brushing	Blade	Mirror	Mirror + explorer
Yes	Yes	1.294Ca (1.532)*	1.529Ba (1.419)*	2.118Aa (1.867)
	No	1.176Ca (1.334)*	1.353Bb (1.366)*	1.647Ab (1.693)
No	Yes	1.118Ca (1.219)*	1.471Ba (1.463)*	2.000Aa (1.936)
	No	0.882Cb (0.927)*	1.353Bb (1.455)*	1.588Ab (1.583)
Brushing	Drying			
Yes	Yes	1.294Ca (1.532)*	1.529Ba (1.419)*	2.118Aa (1.867)
	No	1.118Ca (1.219)*	1.471Ba (1.463)*	2.000Aa (1.936)
No	Yes	1.176Ca (1.334)*	1.353Ba (1.366)*	1.647Aa (1.693)
	No	0.882Ca (0.927)*	1.353Ba (1.455)*	1.588Aa (1.583)

Average values followed by distinct letters (capital letters row-wise and lower case column-wise), always in pairs, are statistically different ($P < 0.05$).
*Significant difference in relation to the examination performed in a traditional dental setting ($P < 0.05$).
DMFS value for examinations performed in a traditional dental setting (2.176).
SD, standard deviation.

Table 4. NC lesion values of epidemiological examinations according to the association or not with previous dental drying and brushing and a comparison to mean values of the examinations performed in a traditional dental setting in relation to the low dental caries prevalence group: Piracicaba, SP, Brazil, 2004

		NC (SD)		
Drying	Brushing	Blade	Mirror	Mirror + explorer
Yes	Yes	2.882Aa (2.369)*	2.882Aa (2.643)*	3.235Aa (2.840)*
	No	2.471Ab (2.503)*	2.294Ab (2.114)*	2.647Ab (2.668)*
No	Yes	1.235Ab (1.602)*	1.529Aa (1.807)*	1.235Aa (1.678)*
	No	0.471Ab (0.717)*	1.353Ab (1.366)*	1.353Ab (1.656)*
Brushing	Drying			
Yes	Yes	2.882Aa (2.369)*	2.882Aa (2.643)*	3.235Aa (2.840)*
	No	1.235Ab (1.602)*	1.529Ab (1.807)*	1.235Ab (1.678)*
No	Yes	2.471Aa (2.503)*	2.294Aa (2.114)*	2.647Aa (2.668)*
	No	0.471Ab (0.717)*	1.353Ab (1.366)*	1.353Ab (1.656)*

Average values followed by distinct letters (capital letters row-wise and lower case column-wise), always in pairs, are statistically different ($P < 0.05$).
*Significant difference in relation to the examination performed in a traditional dental setting ($P < 0.05$).
NC lesion value of examinations performed in a traditional dental setting (4.824).

Table 5. DMFS values of epidemiological examinations according to the association or not of previous dental drying and brushing and a comparison with mean value of the examinations realized in a traditional dental setting, in relation to the moderate dental caries prevalence group: Piracicaba, SP, Brazil, 2004

		DMFS (SD)		
Drying	Brushing	Blade	Mirror	Mirror + explorer
Yes	Yes	4.087Ca (1.164)*	4.565Ba (0.992)	4.783Aa (1.085)
	No	3.739Cb (1.054)*	4.174Bb (0.887)*	4.652Ab (1.301)
No	Yes	3.956Ca (1.224)*	4.435Ba (0.945)	4.696Aa (1.019)
	No	3.435Cb (1.037)*	3.913Bb (1.083)*	4.522Ab (1.123)
Brushing	Drying			
Yes	Yes	4.087Ca (1.164)*	4.565Ba (0.992)	4.783Aa (1.085)
	No	3.956Cb (1.224)*	4.435Bb (0.945)	4.696Ab (1.019)
No	Yes	3.739Ca (1.054)*	4.174Ba (0.887)*	4.652Aa (1.301)
	No	3.435Cb (1.037)*	3.913Bb (1.083)*	4.522Ab (1.123)

Average values followed by distinct letters (capital letters row-wise and lower case column-wise), always in pairs, are statistically different ($P < 0.05$).
*Significant difference in relation to the examination performed in a traditional dental setting ($P < 0.05$).
DMFS value for examinations performed in a traditional dental setting (4.826).
SD, standard deviation.

Table 6. NC lesion values of epidemiological examinations, according to the association or not of previous dental drying and brushing and a comparison with the mean value of the examinations realized in a traditional dental setting in relation to the moderate dental caries prevalence group: Piracicaba, SP, Brazil, 2004

		NC (SD)		
Drying	Brushing	Blade	Mirror	Mirror + explorer
Yes	Yes	3.435Aa (2.677)*	2.913Aa (1.998)*	2.826Aa (2.037)*
	No	2.739Aa (1.864)*	3.174Aa (2.674)*	3.261Aa (2.734)*
No	Yes	1.956Aa (1.965)*	1.739Aa (1.602)*	1.391Aa (1.699)*
	No	0.696Aa (0.876)*	1.913Aa (1.759)*	1.609Aa (1.699)*
Brushing	Drying			
Yes	Yes	3.435Aa (2.677)*	2.913Aa (1.998)*	2.826Aa (2.037)*
	No	1.956Ab (1.965)*	1.739Ab (1.602)*	1.391Ab (1.699)*
No	Yes	2.739Aa (1.864)*	3.174Aa (2.674)*	3.261Aa (2.734)*
	No	0.696Ab (0.876)*	1.913Ab (1.759)*	1.609Ab (1.699)*

Average values followed by distinct letters (capital letters row-wise and lower case column-wise), always in pairs, are statistically different ($P < 0.05$).
*Significant difference in relation to the examination performed in a traditional dental setting ($P < 0.05$).
NC value of examinations performed in a traditional dental setting (4.783).
SD, standard deviation.

dental drying with or without previous dental brushing. (Tables 2, 4 and 6).

Discussion

According to WHO criteria (1) for dental caries, the present study showed, for both low and moderate caries prevalence groups that the visual/tactile method presented the best results, followed by the visual method with dental mirror and, finally, the blade method when the same diagnostic adjuncts were used. These results can be explained by the improvement in the visual field when the mirror is employed. In cases of doubt, the additional use of the CPI dental probe can check for the presence of cavities.

Generally, previous dental brushing was more important than previous dental drying for diagnosing cavitated lesions (WHO criteria). This analysis can be explained because this kind of lesion is easier to diagnose than the NC lesions, even without dental drying. However, previous dental brushing improves the visualization of dental surfaces because it can decrease the dental biofilm that could be deposited on cavities or other dental conditions.

It is interesting to note that the epidemiological examination according to WHO (1) (no. 9 – mirror + CPI dental probe without diagnostic adjuncts), did not show a statistical difference when compared with the standard examination performed in a traditional dental setting. However, this epidemiological examination underestimated caries by approximately 30% in the low prevalence

group. Therefore, particularly for this group, the association of the WHO epidemiological examination with previous dental brushing could be suggested so that the results could reach values above 90%. However, examinations with the blade for this group showed an underestimation rate of around 40–60% even with previous dental drying and brushing.

Therefore, the indication of an examination method and whether or not additional diagnostic adjuncts are used should be in accordance with the purpose of the examination, and, when possible, with prior knowledge of the disease level in the group to be examined. Thus, the examinations with blade can show satisfactory results first, in diagnosing of DMFD components that have been restored, extracted and indicated for extraction (4), and in cases in which patients at risk of dental caries are previously selected, particularly, when clinical, social demographic parameters, among others, are included (6). However, this resource alone should not be indicated, for example, for the strict purpose of data collection through epidemiological surveys of the disease.

The results of the present study can be used mainly for screening child populations in need of treatment, helping public workers and planners to develop and evaluate dental health programmes. These results can also be used to select a method of examination more appropriate for case–control studies or clinical trials, in which preventive measures could be evaluated in groups or populations in relation to the reduction of dental caries levels, including NC lesions or not.

As stated above, the pattern of dental caries has been undergoing profound modifications in high-income countries over the last decades showing drastic decreases in prevalence and incidence of the disease and, consequently, increases in the number of children who are free of dental caries (17, 18). Most of the epidemiological research on this disease still uses dental caries criteria starting from cavitated carious lesions (17). However, other scientific research has demonstrated the need and justification for including NC lesions in epidemiological surveys (2, 11–13, 19). Authors such as Ismail (19), Amarante et al. (9), and Biscaro et al. (2) showed that the prevalence of NC lesions is higher than the prevalence of cavitated lesions. Such information can generate deep reflection in relation to the current epidemiological data on this disease, showing trends for a future redirection in epidemiology, not only with regard to correct epidemiological diagnosis but also to the implementing preventive–therapeutic measures for the population.

Therefore, the inclusion of NC lesions in epidemiological surveys nowadays can primarily be justified for use in planning public oral health services, whether they are for the implementation of preventive or operative treatment. Such surveys can aid in deciding how funds should be directed so that they adequately meet the needs of the individuals and groups in question (2, 10, 11, 19).

However, some epidemiologists consider that one of the major problems lies in the difficulty of diagnosing dental caries in epidemiological surveys because of the examination conditions, the resources usually employed, the inherent difficulties in diagnosing initial lesions, the time spent on the evaluation, as well as the high cost of diagnostic adjuncts (12, 19).

In this study, the use of diagnostic adjuncts, such as prior toothbrushing and drying were more important than the employment of the CPI dental probe, mirror or blade to diagnose NC carious lesions in enamel, mainly for the low caries prevalence group.

However, even with the employment of the diagnostic adjuncts of dental drying and brushing, the results of this study showed that none of the combinations for the epidemiological examinations approached the diagnosis obtained in the dental setting in relation to the NC lesion diagnosis for any of the two prevalence groups. In general, it was found that the underestimation rate was from 24.49 to 90.24% (Table 2). Such information, once again, confirms the difficulties in examining for dental caries and underestimating it in epidemiological examinations.

It has been shown that different light sources (natural, artificial: anglepoise lamp, fibre optic, etc.) could be an additional factor contributing to the wide variation in detecting dental caries in epidemiological surveys (21) for both cavitated (18) and NC lesions (5). In this study, the use of natural light in the epidemiological examinations could be one more reason for underestimating NC lesions in relation to the examination in a dental setting. This affirmative may be justified when one compares the percentage underestimation results of 24.49 and 40.92% of the visual–tactile method with prior drying and brushing with those of the examination performed in a dental setting, for the low and moderate prevalence groups, respectively (Table 2).

Even with such solid justifications for including NC carious lesions in epidemiological sur-

veys, continued research is needed so that future epidemiological information may capture more truly the carious conditions. Thus, such changes would guide public health service planning processes, with improvements mainly as regards diagnosis and preventive–therapeutic treatment in dental health programmes.

Conclusion

In relation to the DMFS index according to WHO criteria: the best method to diagnose dental caries was the visual/tactile method (buccal plane mirror + CPI dental probe), with or without diagnostic adjuncts (previous dental brushing and drying), for the low and moderate prevalence groups for dental caries. Previous dental brushing was more relevant than dental drying for the diagnosis.

In relation to the NC lesion diagnosis, the examination conditions improved significantly with the employment of dental drying alone (moderate prevalence group) or dental drying associated with previous dental brushing (low prevalence group). However, all proposed epidemiological examinations differed statistically from the examination performed in a traditional dental setting.

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