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Discriminant validity of the CAST instrument compared to the dmf index in the deciduous dentition: a cross sectional study

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Abstract: This study aimed to assess the discriminant validity of the Caries Assessment Spectrum and Treatment (CAST) at different thresholds, compared with the Decayed, Missing, and Filled Teeth Index (dmf) instrument, to discriminate caries risk factors. A cross-sectional study was conducted including children aged 2-5 years from preschools in Southern Brazil. Parents answered a questionnaire, and children were clinically examined using the CAST instrument and, in the following weeks, using the dmf index. Two caries thresholds were adopted for CAST: caries in dentin ($CAST_{4-7}$/$CAST_{2,4-8}$) and enamel caries ($CAST_{3-7}$/$CAST_{2-8}$). Poisson regression was used in the analysis ($p < 0.05$). A total of 200 children were included. The prevalence of caries was 47.0% with dmf, 42.5% with $CAST_{4-7}$, and 77.5% with $CAST_{3-7}$. When the outcome was caries prevalence, $CAST_{4-7}$ discriminated between sexes, household crowding, and dental pain, and $CAST_{3-7}$ discriminated age and family income, while the dmf was associated with dental pain. When experience of caries was the outcome, all the criteria discriminated between sexes, age, family income, household overcrowding, visible dental plaque, and dental pain, while dmf and $CAST_{2-8}$ also discriminated maternal schooling. The CAST discriminated caries risk factors similar to the dmf index when caries experience was the outcome. When prevalence was considered, CAST was able to discriminate for more individual characteristics than dmf.

Keywords: Cross-Sectional Studies; Dental Caries; Diagnosis; Epidemiology; Child.

Introduction

Dental caries affects children globally, resulting in a major public health problem.[1] Knowledge about the prevalence of a disease and associated factors is important for planning strategies to control it,[2] requiring ongoing assessments of the disease status. Different instruments for assessing dental caries have been described in the literature.[3,4,5,6] Overall, they differ in the determination of the different stages of caries progression.[7] The Index of Carious, Missing, and Filled Teeth (dmf/DMF) is the instrument recommended by the World Health Organization (WHO)[4] and has been

widely used in studies worldwide. This index is intended for the detection of dental caries when there is obvious cavitation, and restored and lost teeth are also accounted for determining the prevalence of dental caries.

More recently, the Caries Assessment Spectrum Treatment (CAST) instrument has been developed to evaluate the entire progression of caries disease.[7] This instrument detects the initial lesions on the enamel till the pulp involvement, the presence of an abscess or fistula and allows the adoption of different thresholds to report the prevalence of dental caries. Sealed, restored, and lost teeth due to caries are also evaluated; however, based on the rationale of the instrument, they are not accounted for determining the disease prevalence.[6]

Using a conversion criterion proposed by the authors of the CAST instrument,[6] this system presented results similar to those obtained by the DMF/dmf index for prevalence and experience of dental caries.[8,9,10] However, the threshold for the disease where CAST has a better ability to discriminate distinct subgroups is unknown. Additionally, to date, no study has compared the discriminant capacity of the CAST instrument at different thresholds for dental caries with the discriminant validity of the dmf index. Assessment of the CAST ability to discriminate dental caries risk factors at different thresholds is important for determining the discriminatory power of the instrument.

In addition, it is not clear whether the inclusion of early stage carious lesions influence association with the risk indicators for the disease. Studies using the International Caries Detection and Assessment System (ICDAS) illustrate that this more recent index can discriminate among groups of children and adults with different exposure to risk factors.[11] Mendes et al.[12] have investigated the discriminatory power of the ICDAS compared to the WHO standard criteria and found that cavitated scores of ICDAS present similar discriminant validity compared with dmf criteria when the presence of caries is used as an outcome; however, the index loses discriminatory power when non-cavitated caries is included. When dmfs values are used, no differences are observed in the use of non-cavitated or cavitated carious lesions. According to the authors,[12] this issue should be addressed in further studies owing to variable results in populations with different prevalence of dental caries.

Thus, the discriminant validity of CAST compared with dmf in primary dentition has not been evaluated, and investigating this characteristic is important to appraise the comprehensiveness of the method.[12] Therefore, this study aimed to determine the ability of the CAST instrument to discriminate socioeconomic, demographic, and clinical factors associated with the onset of dental caries at different thresholds in a sample of preschool children, and to compare it with the discriminatory power of the dmf index. The hypothesis was that the CAST instrument, at all thresholds, would be able to discriminate subgroups and that CAST and dmf would have similar discriminating ability.

Methodology

This study was reported using Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).[13]

Study design and sample population

This is a cross-sectional school-based study, conducted with children aged 2–5 years enrolled in pre-schools of the municipality of Capão do Leão, South Brazil. According to data from the last demographic census, the city has 24,928 inhabitants, with 2,280 aged 0–5 years.

The city has three public schools that serve the age group of the study and do not have private schools. A total of 267 preschoolers aged 2–5 years were enrolled in schools in 2018 and were initially considered eligible to participate in the study. A minimum sample size of 153 children was predicted to detect a prevalence of 39% of dental caries in preschool children,[14] considering a 95% confidence level. Children with physical or psychological disabilities that made the examination impossible were excluded.

This study was approved by the local Municipal Secretary of Education and by the local Human Research Ethics Committee under protocol 2.531.245.

The legal guardians were informed about the study, and they signed a consent form to authorize the use of the data and child's participation in the research. Additionally, children who did not allow and/or did not cooperate with the oral examination were not included, although they could participate. The CAST instrument and the dmf index were designed for use in epidemiological research, assisting in the planning of oral health services. Thus, parents received written information about their children's oral health according to the results of the epidemiological examination and were oriented for carrying out a more comprehensive assessment in a dental office, for which the contacts of the School of Dentistry were made available. Preschoolers were given toothbrushes, and they participated in oral health education activities, including oral hygiene instructions; children with pain or infection were referred to the School of Dentistry for treatment.

Data collection

Family demographic, socioeconomic, and dental pain data were collected through a questionnaire sent to parents or legal guardians through the school. The child's age was collected in years and dichotomized (2–3 years/4–5 years). Maternal schooling was collected in terms of years of study and categorized into two groups (<8 years/≥ 8 years). The monthly income was collected in Brazilian Reais and dichotomized by the median up to 1.5 Brazilian minimum wage and greater than 1.5 Brazilian minimum wage (≤ 1.5 BMW/> 1.5 BMW). Parents were also questioned about the number of people living in the house (≤ 4/> 4). Pain was assessed by asking the parents about the occurrence of dental pain in their son/daughter in the last 6 months and dichotomized into yes (present) and no (absent).[15]

The oral examinations were carried out between May and August, 2018 at the school's facilities, by two previously trained and calibrated post-graduate students. The presence of visible plaque was collected following the criteria of Alaluusua and Malmivirta,[16] which suggested visual inspection of the vestibular surfaces of the upper central incisors and dichotomized into yes (presence of plaque) and no (absence of visible plaque).

Dental caries was initially evaluated by the CAST instrument, and in the following weeks, the children were reevaluated for dental caries using the dmf index. The CAST instrument is composed of 10 codes classified hierarchically: 0: healthy; 1: sealant; 2: restoration; 3: distinct visual change only in the enamel; 4: discoloration related to internal caries in the dentin; 5: distinct cavitation in dentin; 6: involvement of the pulp chamber; 7: abscess / fistula; 8: lost by caries; and 9: none of the previous descriptions.[7] Using the dmf index, the surfaces were recorded as sound, decayed, missing, or filled. Caries were recorded when it had evident cavity, unsupported enamel, or detectably softened bottom or wall.[4]

The examinations with both instruments were performed on the school premises, with the children in the supine position, chin up on school tables, using artificial lighting (study lamp), clinical mirror, and, the Community Periodontal Index probe, if required. After registering the visible plaque, the dental surfaces were cleaned with a toothbrush and excess moisture was removed with gauze and/or cotton swabs. The examinations were typed directly into a specific form using the Microsoft Office Excel program.

Schools were visited until no more than 10% of the children were absent from the oral examination using CAST. For evaluation using the dmf index, the same examiners visited the classes at least twice.

Training and calibration methods

For use of the CAST, the researchers participated in theoretical and practical training (12 hours) with the authors of the CAST instrument. A new theoretical and practical training using the material provided by the instrument developers was carried. The theoretical training (4 hours) included the presentation of the guidelines and structure of the instrument, its codes and descriptors, protocol and manner of conducting the exam, and photographs illustrating the clinical situations covered by the instrument. In practical training (4 hours), photographs and extracted teeth were examined, and disagreements were discussed.

Training for the use of the dmf index was also conducted with the study examiners. This included a theoretical stage (4 hours), where the instrument

structure, its codes and descriptors were presented, and a practical stage (4 hours), with the examination of photographs and extracted teeth, followed by discussion of the disagreements.

After the training, calibration was performed for both instruments. A sample of 10 children of the same age group and socioeconomic status of the main study was preselected. The first examinations were discussed together between the study examiners and the experienced examiner. Afterwards, 20 children were individually examined by each examiner and the values obtained were compared to those of the experienced examiner to ensure inter-examiner agreement. The weighted kappa coefficient (k) was 0.68 and 0.72 (CAST), and 0.96 and 0.92 (dmf) and the agreement percentage (Po) was 96.2% and 97.0% for the CAST instrument and 99.7% and 99.3% for the dmf index, respectively. For determining the intra-examiner agreement, 10% of the sample in the main study was reexamined, and both examiners achieved acceptable results. The mean weighted kappa coefficient was 0.71, with 0.021 standard error (SE) and Po was 97.0%.

Data analysis

Data of the questionnaires were double-typed, with posterior checking, in the Microsoft Office Excel program. The analyses were conducted using Stata 14.0 software (Stata Corporation, College Station, USA). Initially, descriptive statistics were made.

The threshold for dental caries was defined according to the concepts of each instrument. CAST uses the health/disease concept and considers surfaces treated with sealants (code 1), restorations (code 2), and extracted teeth (code 8) to be healthy. Therefore, only children who had carious lesions without treatment were counted for the prevalence of caries assessed with CAST. Therefore, CAST codes 1, 2, and 8 were not included in the prevalence of the disease. The prevalence of dental caries obtained by the CAST instrument was then estimated using two different cutoff points, following the concept proposed by the instrument: $CAST_{4-7}$ included caries in dentin (codes 4–7 were considered caries) and $CAST_{3-7}$ included enamel caries (codes 3-7 were considered caries).[17]

The caries experience using the CAST was calculated at the dental surface level, and was also obtained from two thresholds, which included untreated illness and previous experience (sealed and restored surfaces and missing teeth), as follows: dentin threshold: $CAST_{2,4-8}$ (codes 2 and 4-8 were included), and enamel threshold: $CAST_{2-8}$ (codes 2-8 were included)[17]. For the calculation of the prevalence and experience values obtained with the dmf index, all components (d/m/f) were included, as suggested by the instrument.[4]

For determining the discriminant validity of the instruments, the association between the independent variables and the presence of caries was initially assessed using the dmf index and thresholds for the CAST instrument. The prevalence ratio, confidence interval (95% CI), and level of significance were obtained using the Poisson regression analysis with robust variance. The experience values obtained using the same thresholds for the CAST and using the dmf index were also associated with the independent variables to assess discriminant validity. The rate ratio (95% CI) and significance levels were obtained using the Poisson regression analysis with robust variance. Analyses were conducted adopting a level of statistical significance defined at $p < 0.05$.

Results

Of the 264 eligible children, 40 (15.1%) did not return the authorization, 14 (5.3%) were absent or did not allow the oral examination, and 10 (3.8%) were absent or no longer attending school in the second stage. The rate of return was 75.8%, and the final sample consisted of 200 children.

Table 1 shows the distribution of children with dental caries classified by the dmf index and the two thresholds for the CAST instrument and demographic, socioeconomic, and clinical variables. The prevalence of dental caries in preschoolers was 47.0% with the dmf index, 42.5% with $CAST_{4-7}$, and 77.5% with $CAST_{3-7}$. Caries' experience values (mean ± SD) according to the different instruments and cut-off points and independent variables are presented in Table 2. Higher values were observed for $CAST_{2-8}$.

Table 1. Prevalence of caries according to the CAST at thresholds $CAST_{4-7}$ and $CAST_{3-7}$ and to the dmf index and independent variables (n = 200).

Variables	n	dmf	$CAST_{4-7}$	$CAST_{3-7}$
		n (%)	n (%)	n (%)
Sex				
Female	99	40 (40.4)	34 (34.3)	74 (74.8)
Male	101	54 (53.5)	51 (50.5)	81 (80.2)
Age				
2–3 years	29	11 (37.9)	8 (27.6)	16 (55.2)
4–5 years	171	83 (48.5)	77 (45.0)	139 (81.3)
Maternal education*				
< 8 years	42	23 (54.8)	19 (45.2)	34 (81.0)
≥ 8 years	149	64 (43.0)	60 (40.3)	113 (75.8)
Family income*				
> 1.5 BMW	86	35 (40.7)	31 (36.1)	62 (72.1)
≤ 1.5 BMW	77	43 (55.8)	37 (48.1)	66 (85.7)
Number of people living in the house*				
≤ 4 peoples	142	61 (43.0)	52 (36.6)	110 (77.5)
> 4 peoples	53	30 (56.6)	30 (56.6)	41 (77.4)
Presence of visible plaque				
No	146	65 (44.5)	58 (39.7)	109 (74.7)
Yes	54	29 (53.7)	27 (50.0)	46 (85.2)
Dental pain in the last 6 months				
No	170	71 (41.7)	63 (37.1)	130 (76.5)
Yes	30	23 (79.3)	22 (75.9)	24 (82.8)

*missing data.

Dental pain was significantly associated with the presence of dental caries, as assessed by the dmf and $CAST_{4-7}$. Male sex and household overcrowding were associated with the occurrence of dental caries, as evaluated by the $CAST_{4-7}$. Age between 4 and 5 years and family income of up to 1.5 Brazilian minimum wage showed a significant association with the occurrence of dental caries, as evaluated by the $CAST_{3-7}$. Maternal schooling and presence of visible plaque were not associated with the occurrence of dental caries assessed at any instrument (Table 3).

Male sex, age between 4 and 5 years, family income of up to 1.5 Brazilian minimum wage, household overcrowding, presence of visible plaque, and dental pain were significantly associated with caries experience, regardless of the criteria adopted (Table 4). Lower maternal schooling was significantly associated with caries experience when dmf and $CAST_{2-8}$ were the criteria used.

Discussion

This study has investigated a representative sample of preschool children using the dmf index, which is the most used instrument worldwide, compared with the CAST instrument, to determine caries prevalence and experience and to evaluate the discriminant validity of CAST in primary dentition, compared with dmf. The CAST instrument uses the epidemiological concept of health and disease and is not included in the prevalence of the disease, treated surfaces with sealants, restorations, and extracted teeth.[17] In this study, when comparing the prevalence

Table 2. Caries experience (mean ± SD) according to the CAST at thresholds $CAST_{2,4-8}$ and $CAST_{2-8}$ and to the dmf index and independent variables (n = 200).

Variables	dmf	$CAST_{2,4-8}$	$CAST_{2-8}$
Sex			
Female	3.31 ± 7.92	2.78 ± 6.41	8.67 ± 10.31
Male	4.47 ± 8.40	3.81 ± 6.70	9.50 ± 9.33
Age			
2–3 years	1.93 ± 4.50	1.38 ± 3.71	3.31 ± 5.28
4–5 years	4.22 ± 8.60	3.63 ± 6.89	7.99 ± 9.67
Maternal education*			
< 8 years	4.24 ± 6.62	3.57 ± 5.60	8.10 ± 8.23
≥ 8 years	3.46 ± 8.45	3.01 ± 6.72	6.87 ± 9.55
Family income*			
> 1.5 BMW	2.40 ± 4.76	2.17 ± 4.34	5.92 ± 7.61
≤ 1.5 BMW	5.96 ± 11.21	4.96 ± 8.87	9.34 ± 11.27
Number of people living in the house*			
≤ 4 peoples	3.11 ± 7.00	2.56 ± 5.87	6.18 ± 8.12
> 4 peoples	6.19 ± 10.69	5.43 ± 8.05	10.57 ± 11.62
Presence of visible plaque			
No	3.21 ± 7.14	2.70 ± 5.97	5.96 ± 8.08
Yes	5.74 ± 10.30	4.93 ± 7.78	10.96 ± 11.29
Dental pain in the last 6 months			
No	1.29 ± 4.46	1.75 ± 3.41	5.54 ± 7.02
Yes	12.5 ± 15.33	10.93 ± 11.92	16.35 ± 13.64

*missing data.

Table 3. Prevalence ratio values (95%CI) calculated by Poisson regression, using children with caries as the outcome according to CAST at thresholds $CAST_{4-7}$ and $CAST_{3-7}$ and to the dmf index and independent variables (n = 200).

Variables	dmf	$CAST_{4-7}$	$CAST_{3-7}$
Sex (ref.: female)			
Male	1.32 (0.98– 1.79) p = 0.068	1.47 (1.05– 2.05) p = 0.024	1.07 (0.92– 1.25) p= 0.359
Age (ref.: 2–3 years)			
4–5 years	1.28 (0.78– 2.09) p = 0.326	1.63 (0.88– 3.02) p = 0.118	1.47 (1.05– 2.06) p = 0.024
Maternal education* (ref.: < 8 years)			
≥ 8 years	0.78 (0.56– 1.09) p = 0.152	0.89 (0.60– 1.31) p = 0.556	0.94 (0.79– 1.11) p = 0.459
Family income* (ref.: > 1.5 BMW)			
≤ 1.5 BMW	1.37 (0.99– 1.90) p = 0.056	1.33 (0.92– 1.92) p = 0.124	1.19 (1.01– 1.40) p = 0.035
Number of people living in the house* (ref.: ≤ 4 peoples)			
> 4 people	1.31 (0.97– 1.78) p = 0.075	1.55 (1.12– 2.13) p = 0.008	1.00 (0.84– 1.18) p = 0.987
Presence of visible plaque (ref.: No)			
Yes	1.21 (0.89– 1.64) p = 0.232	1.26 (0.90– 1.76) p = 0.177	1.14 (0.99– 1.32) p = 0.077
Dental pain in the last 6 months (ref.: No)			
Yes	1.18 (1.09– 1.28) p < 0.001	1.19 (1.09– 1.29) p < 0.001	1.04 (0.94– 1.15) p = 0.423

*missing data.

Table 4. Rate ratio values (95%CI) calculated by Poisson regression using experience values as the outcome according to the CAST at thresholds $CAST_{2,4-8}$ and $CAST_{2-8}$ and to the dmf index and independent variables (n = 200).

Variables	dmf	$CAST_{2,4-8}$	$CAST_{2-8}$
Sex (ref.: female)			
Male	1.35 (1.17– 1.55) p < 0.001	1.37 (1.18– 1.60) p < 0.001	1.25 (1.13– 1.38) p < 0.001
Age (ref.: 2–3 years)			
4–5 years	2.19 (1.67– 2.87) p < 0.001	2.63 (1.91– 3.62) p <0.001	2.41 (1.96– 2.97) p < 0.001
Maternal education* (ref.: < 8 years)			
≥ 8 years	0.82 (0.69– 0.97) p = 0.020	0.84 (0.70– 1.01) p = 0.068	0.85 (0.75– 0.96) p = 0.009
Family income* (ref.: > 1,5 BMW)			
≤ 1,5 BMW	2.49 (2.11– 2.93) p < 0.001	2.28 (1.92– 2.72) p < 0.001	1.58 (1.41– 1.77) p < 0.001
Number of people in the house* (ref.: ≤ 4)			
> 4 peoples	1.99 (1.73– 2.30) p < 0.001	2.13 (1.82– 2.48) p < 0.001	1.71 (1.54– 1.90) p < 0.001
Presence of visible plaque (ref.: No)			
Yes	1.79 (1.55– 2.06) p < 0.001	1.83 (1.56– 2.13) p < 0.001	1.84 (1.66– 2.04) p < 0.001
Dental pain in the last 6 months (ref.: No)			
Yes	5.72 (3.41– 9.62) p < 0.001	6.23 (3.88– 10.02) p < 0.001	2.95 (2.09– 4.16) p < 0.001

*missing data.

of dental caries using the dmf and $CAST_{4-7,}$ the results were similar, despite dmf index accounting for restorations and extractions in the prevalence of caries, including past and present disease. Although dmf could overestimate the prevalence of individuals with the current disease and untreated, only a few children in this sample had these conditions. In the primary dentition, most teeth affected by caries are left untreated,[18,19] which may justify similar values of prevalence.

Previous experiences of disease are linked to future caries experiences, as restored teeth will need to be replaced (especially among adults) throughout life and, in children with previous caries experience, the risk of developing new lesions is higher compared to children without previous dental caries.[20] The CAST instrument clearly differentiates past caries experience from caries prevalence, which facilitates the understanding of the history of the disease in a population from the treatment needs that they present when the evaluation takes place. The first data may be helpful in the prediction of future disease, while the second one precisely orientates the severity of the disease and actions that should be taken.

Only slightly more than half of the children in this study were free of dental caries when examined using the dmf index (53.0%) and $CAST_{4-7}$ (57.5%). These results are comparable to the prevalence of caries in Brazilian children[20] because only 46.6% of 5– year–old children were free of the disease. When enamel lesions ($CAST_{3-7}$) were included, only one– fifth of the children were free of caries (22.5%), revealing an increase of 35% in relation to the CAST dentin threshold and 30% higher compared to dmf. This large increase in prevalence is expected and is in accordance with the previous studies using the CAST, which also reported a larger number of children affected by the disease when enamel lesions were accounted.[21] The high prevalence of caries in this population reinforces the importance of epidemiological surveys

investigating the occurrence of dental caries to help establish preventive strategies. Additionally, data on the percentage of children with only enamel lesions is useful for the planning of public health managers as this condition can be easily managed in schools and health services, avoiding the need for more invasive and costly treatments.

When the prevalence of dental caries was used as the outcome, the CAST instrument, at the cut– off points adopted, discriminated more risk factors for dental caries than the dmf index. Male sex and higher household crowding were associated with caries occurrence with the CAST threshold for dentin caries ($CAST_{4-7}$), while higher age and lower family income were associated with caries occurrence with the enamel caries threshold ($CAST_{3-7}$). The dmf index and $CAST_{4-7}$ discriminated for the occurrence of pain. Therefore, in this sample, the CAST instrument, at both cutoff points, was more sensitive in discriminating risk factors for the occurrence of caries than the dmf index. These results are different from those of a previous study that compared the discriminant validity of the dmf index with different cut– off points of the ICDAS.[12] In that study, demographic and socioeconomic variables were not associated with ICDAS when non– cavitated lesions were included (ICDAS 2), despite the fact that they were associated with caries diagnosed using dmf and with ICDAS 3, including lesions with enamel breakdown. According to the authors, this loss of discriminant capacity with the inclusion of non– cavitated lesions was owing to nearly all children presenting caries when these lesions were included (83.3%). Therefore, the difference in the results of these studies may have occurred due to the different prevalence of disease stages in the populations studied, in addition to the different criteria used in the diagnosis.

When caries experience was used as outcome, the inclusion of enamel lesions did not change the discriminant validity of the CAST instrument. In fact, some variables that had been associated with the count outcome were not associated with the presence of minimum one lesion. All the adopted criteria discriminated for sex, age, household income, household overcrowding, and visible plaque, and the dmf and $CAST_{2-8}$ also discriminated maternal schooling. All these variables are recognized risk factors for the development of dental caries in children. In addition age was associated with increase in dental caries experience.[22,23,24] The presence of pain was also associated with caries regardless of the criteria used, confirming that the inclusion of enamel lesions did not affect the discriminant validity. A study using CAST to evaluate factors associated with dental caries in children aged 2– 4 years in a city in Tanzania, adopting different cut– off points for CAST also found association with the child's age; however, other demographic and socioeconomic characteristics were not associated with dental caries at any threshold.[2]

One of the advantages of using CAST is that it provides information on enamel caries lesions[9,10] An increase in the prevalence and experience of early stages of caries with age is an indication that the population is at risk of developing the disease.[8] In addition, the primary teeth are subject to an accelerated progression of enamel caries to the dentin and later to the pulp, owing to the smaller thickness of the dentin and wider pulp chamber.[25] In contrast, a study evaluating progression to dentine cavitation in primary dentition has found that the rate of progression of initial non– cavitated caries is low, while that for teeth presenting with cavitated enamel lesions is remarkably high.[26] The CAST instrument does not differentiate enamel lesions into cavitated or non– cavitated, both being registered under the same code. Thus, we suggest new studies using the CAST, with a longitudinal design and evaluation of the presence or absence of cavitation in the enamel, with analysis of disease progression. The inclusion of initial enamel lesions in oral health surveys can therefore be justified by the knowledge acquired over the last decades on the control of caries initiation and progression[27] and because the different stages of dental caries may have different associated factors, which has been investigated in this study.

The CAST instrument is a promising tool for international use in epidemiological studies on dental caries.[8] The results of this study suggest that the instrument can be used in epidemiological surveys intended to assess caries lesions, as it can identify children with increased disease experience.

This study has the limitation of its cross– sectional design, which does not allow the evaluation of causal relationships between the disease and associated factors. The external and internal validity of the study was ensured, as all preschools in the city were included and dentists were trained and calibrated.

CAST is a useful and practical index in epidemiological surveys,[28] However as it was more recently developed, the literature lacks studies using this instrument to evaluate factors associated with dental caries in different age groups. Thus, it is difficult to compare these findings, because few studies exist assessing the same age range of our study.[2] To the best of our knowledge, this is the first study to investigate the discriminatory power of CAST. Therefore, new studies are suggested, with longitudinal design and investigation of the factors associated with the different stages of caries in the primary dentition and in other age groups.

Conclusions

In the present study, the CAST instrument had the ability to discriminate risk factors for dental caries similar to the dmf index when the caries experience was used as an outcome. When prevalence was considered, CAST was able to discriminate for more individual characteristics than dmf.

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