# Parental preferences for dental caries treatment in preschool children according to socio-demographic conditions and beliefs about the primary dentition

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## Abstract

**Aim** To assess parental preferences for dental caries treatment and its association with socio-demographic conditions and beliefs about the primary dentition.

**Methods** Study design: Cross-sectional study. This study was conducted among 512 parents of 2- to 5-year-old children in the State of Tocantins, in the North Region of Brazil. A self-administered questionnaire on preferences for dental caries treatment, socio-demographic conditions and beliefs about the primary dentition was responded by parents considering two hypothetical clinical scenarios: if their child had one or more asymptomatic caries lesions (without pain), one or more symptomatic caries lesions (toothache). Poisson regression models fitted the association between explanatory variables and the preference to conservative interventions.

**Results** A non-negligible proportion of parents prefer non-conservative dental treatments for their children. In both clinical scenarios, older and more schooled mothers were significantly ($p<0.05$) more likely to prefer conservative interventions. Wrongly believing that root canal treatment is not applicable to primary teeth was associated with a lower willingness to conservative treatments (PR=0.93, p=0.047 for the symptomatic scenario and PR=0.86; p=0.003 for the asymptomatic scenario), thus favouring the option for tooth extraction.

**Conclusion** It can be concluded that parental preferences for dental caries treatment in preschool children depend on mother's age and education level, as well as on beliefs about the primary dentition.

KEYWORDS Dental caries; Preschool children; Parents.

## Introduction

Caries is a multifactorial pathology and is one of most common and most expensive diseases in children with potential risk of damage to the permanent teeth [Meriç et al., 2020; Valpreda et al., 2020; Míšová et al., 2021]. A diet that from childhood is characterised by a high consumption of sugar-rich food and drinks is highly associated with the incidence of caries in later years [Severino et al., 2021].

Untreated dental caries in primary teeth is the 10th most prevalent paediatric condition, affecting 621 million children worldwide [Kassebaum et al., 2015]. A recent systematic review concluded that dental caries affects more than half of the children population in Latin American and Caribbean countries [Gimenez et al., 2016]. A previous epidemiological survey assessing the oral health of 5-year-old children in Brazil reported a 53.1% prevalence of dental caries. The dmft index was 2.41 and the d component accounted for more than 90% of this score [Ardenghi et al., 2013]. These numbers highlight the paramount challenge faced by paediatric dentistry in Brazil and worldwide. The main reason justifying the treatment of caries in the primary dentition is its negative impact on oral health-related quality of life (OHRQoL) of preschool children [Abanto et al., 2012; Ramos-Jorge et al., 2014; Ribeiro et al., 2015; Díaz et al., 2018; Rai and Tiwari, 2018; Rajab and Abdullah, 2020; Arora et al., 2021; Pakkhesal et al., 2021] and the significant improvement of toddlers' OHRQoL when dental caries lesions are treated [Abanto et al., 2016]. However, the commitment of parents to the dental treatment of their young children has been scarcely studied.

The dental literature has discussed some proposals to treat more or less extensively dental caries lesions with and without symptoms [Llewelyn et al., 2000; Fayle et al., 2001; Rock, 2002; Smaïl-Faugeron et al., 2018]. Both approaches are adopted in many countries and the choice of how treating primary teeth with caries lesions and pulp involvement is still a controversial matter [Tickle et al., 2007; Fukai et al., 2010; Foley, 2012]. Treatment options can vary from non-conservative (tooth extraction) to conservative procedures (dental filling and root canal treatment with fluoride materials) [Zampetti and Scribante, 2020].

Parents are the main decision makers on matters affecting

child health and health care [Cafferata and Kasper, 1985; Hickson and Clayton, 2002; Díaz et al., 2018; Arora et al., 2021]. However, few studies assessed parental preferences to the treatment of caries in the primary dentition, according to different clinical scenarios and symptoms [Tickle et al., 2003; Popoola et al., 2013]. Even so, parental attitudes to dental care of their children differ across socio-demographic strata and the assessment of how beliefs about primary dentition influence this outcome is yet to be done.There is a need of this kind since parental misinformation on the primary dentition can retard the access of young children to the dentist, and their opinions can influence the quest for professional care.

This study aimed at describing parental preferences to the treatment of dental caries in their children, according to different clinical scenarios (with or without symptoms), socio-demographic conditions and beliefs about primary dentition.

## Materials and methods

This study was approved by the Research Ethics Committee of the School of Dentistry São Leopoldo Mandic, Campinas, São Paulo, Brazil (N. 1,367,571). All parents received information regarding the aim of the study and signed an informed consent form.

### Study population

A cross-sectional survey was conducted assessing parents of a multistage random sample of 2- to 5-year-old preschool children regularly attending 36 private schools and 32 public schools in the city of Palmas, the capital of the state of Tocantins, in the North Region of Brazil. Palmas had an estimated population of 272,726 inhabitants in 2015, including 20,278 children under 5 years old (BIGS, 2010).

The sample size was calculated using standards previously applied by the national survey of oral health in Brazil, performed in 2010 [Ardenghi et al., 2013]: prevalence of 46.5% (dental caries in the primary dentition in Palmas), the error of 5%, a significance level of 95% and a design effect of 1.2. The minimum sample size thus obtained (459 children) was increased by 10% to allow correcting for an estimated non-response rate, which resulted in a final sample of 510 children. Inclusion criteria consisted of children of both genders, who were not affected by systemic diseases or neurological disorders.

The selection of participants observed a 2-stage random sampling. The primary survey units were 68 schools in the city. A total of eight private and ten public schools were randomly selected, with a chance proportional to the number of enrolled children, and considering their geographic distribution in the districts of the city [WHO, 2013]. As the schools differed in size, an equal probability selection method was employed to ensure that all children would have the same chance to be selected [WHO, 2013]. The secondary survey units were the 2- to 5-year-old children enrolled in each selected school.

### Data collection

Data were collected using self-administered questionnaires, which were sent to parents via the school staff. One of the parents, preferably the one who spent most of the time with the child, was asked to answer a questionnaire comprising all the information assessed in this study.

The outcome of the study was the question on what treatment for dental caries in the primary dentition parents would prefer, according to two hypothetical clinical scenarios:

1 if their child had a painless (asymptomatic) dental caries;
2 if their child had a toothache (symptomatic dental caries).

Four standard treatment options were offered as options for each clinical scenario: dental filling, root canal treatment, dental extraction, or not interfering with the tooth (no treatment). The two former responses were considered conservative treatment, whereas the two latter were considered non-conservative treatment.

As demographic characteristics, the questionnaire included age and gender (both from the child and the parent), family structure (whether the child lived with both parents or had another family structure), education level of the mother, number of children in the family and family income. This covariate was informed in terms of the Brazilian currency (BRL), which corresponded to nearly 0.32 USD during the period of data gathering. The questionnaire also asked the parents to inform on their beliefs about the primary dentition. Beginning with "Do you believe that", the following questions were asked: Has your child inherited your teeth?; Have primary teeth roots?; Do primary teeth need dental treatment?; May primary teeth need root canal treatment (to remove the tooth nerve)?; Does using antibiotics cause tooth decay?; Can primary teeth erupt decayed?

### Statistical analysis

Data analysis used the SPSS 19 (Chicago, IL, USA). The descriptive assessment used measures of central tendency and dispersion (mean and standard deviation) for quantitative variables and absolute and relative frequencies for categorical variables. Poisson regression models with robust variance were fitted to evaluate the association between the parental preferences of treatments for dental caries and covariates on socio-demographic characteristics and beliefs about the primary dentition. This assessment of associations between the outcome variable and covariates used prevalence ratios (PR) and their respective confidence intervals (95% CI). Having a p-value $\leq 0.20$ in the unadjusted assessment of association was a prerequisite for the inclusion of covariates in the adjusted regression model. Having a p-value $\leq 0.05$ in the adjusted model was the criterion for choosing covariates that remained in the final regression model.

## Results

This study assessed 550 eligible participants, of which 512 filled the form and signed the parental informed consent, thus accounting for a participation rate of 93.1%. The age of the children ranged from 2 to 5 years old, 42.2 months in average (12.6 months, standard deviation). The questionnaires were mainly answered by mothers (94.3%).

Table 1 shows the distribution of the sample according to socio-demographic characteristics, parental preferences for dental caries treatment and beliefs about the primary dentition. A predominant lower education level among parents was observed.

Overall, parents informed preferring conservative options (dental filling or root canal treatment) for both clinical scenarios: 85.6% for asymptomatic dental caries, and 72.5% for dental caries involving toothache. The dental filling was the most frequent treatment option for both clinical scenarios; the preference for dental extraction more than tripled when a toothache was included in the clinical scenario (Table 1).

Concerning beliefs about the primary dentition, 40.4% of the

| Socio-demographic characteristics | n (%) or mean (standard deviation) |
|---|---|
| Child's age | |
| 2 years | 108 (21.1) |
| 3 years | 144 (28.1) |
| 4 years | 148 (28.9) |
| 5 years | 112 (21.9) |
| Child's gender | |
| Male | 253 (49.6) |
| Female | 257 (50.4) |
| Family structure | |
| Nuclear Family (living with mother and father) | 378 (74.3) |
| Non-nuclear family | 131 (25.7) |
| Number of children | |
| Up to 2 children | 364 (74.9) |
| 3 or more children | 122 (25.1) |
| Mother's age (mean and standard deviation) | 29.8 (6.1) |
| Education of the mother | |
| Up to 8 years of study | 281 (57.9) |
| 9 or more years of study | 204 (42.1) |
| Education of the father | |
| Up to 8 years of study | 278 (65.3) |
| 9 or more years of study | 148 (34.7) |
| Family monthly income (mean and standard deviation) | 3,192 (3,611) |
| Parental preferences for dental caries treatments | n (%) |
| *Which treatment would you prefer if your son had a tooth with* an asymptomatic dental caries… | |
| dental filling | 336 (65.8) |
| root canal treatment | 101 (19.8) |
| dental extraction | 61 (11.9) |
| no treatment | 13 (2.5) |
| a symptomatic dental caries | |
| dental filling | 199 (39.2) |
| root canal treatment | 169 (33.3) |
| dental extraction | 134 (26.4) |
| no treatment | 6 (1.2) |
| Beliefs about the primary dentition | n (%) |
| Do you believe that.. your child has inherited your teeth?. | |
| Yes | 205 (40.4) |
| No | 303 (59.6) |
| Have primary teeth roots? | |
| Yes | 303 (59.6) |
| No | 205 (40.4) |
| Do primary teeth need dental treatment? | |
| Yes | 463 (90.8) |
| No | 47 (9.2) |
| May primary teeth need root canal treatment (to remove the tooth nerve)? | |
| Yes | 222 (43.6) |
| No | 287 (56.4) |
| Does using antibiotics cause tooth decay? | |
| Yes | 384 (75.6) |
| No | 124 (24.4) |
| Can primary teeth erupt decayed? | |
| Yes | 232 (45.4) |
| No | 279 (54.6) |

TABLE 1 Characteristics of participants and their offspring (N=512).

parents stated that primary teeth do not have roots; an even larger proportion (56.4%) believed that primary teeth do not need root canal treatment. Almost half the participants (45.4%) stated that tooth decay can affect deciduous teeth previously to their eruption; nearly three quarters (75.6%) believed that using antibiotics could weaken the teeth (Table 1).

Table 2 depicts the assessment of associations between explanatory variables and the preference for a conservative treatment of dental caries within the asymptomatic clinical scenario. The adjusted model showed a lower willingness for conservative dental treatment among parents with a higher number of children (Prevalence Ratio - PR=0.90; 95% Confidence Interval - CI=0.82-0.98). Contrariwise, older and more schooled mothers were significantly ($p<0.05$) more willing to prefer a conservative treatment for asymptomatic dental caries in their offspring. Participants who believed that primary teeth do not need root canal treatment were less likely to report preferring a conservative dental treatment: PR=0.93; 95% CI=0.87–0.95 (Table 2).

Table 3 synthesises the assessment of factors associating with the option for a conservative treatment of dental caries within the symptomatic clinical scenario. The likelihood of preferring dental filling or root canal treatment increased with the age ($p=0.001$) and the schooling level of the mother ($p<0.001$); the number of children was not significantly associated with this outcome. When dental caries involved a toothache, parents who did not know that primary teeth can be submitted to root canal treatment were less likely to opt for a conservative dental treatment for their offspring: PR=0.86; 95% CI=0.77–0.95 (Table 3).

## Discussion

Although the preference for conservative dental treatments is predominant, many parents still prefer dental extraction and no treatment at all when dental caries affects the primary dentition of their children. The proportion of parents preferring an extraction more than tripled when dental pain was involved in the clinical scenario. Education level of parents has been associated with dental caries [Yassin et al., 2020], older and more schooled mothers were significantly more likely to prefer conservative options, irrespective of the incidence of toothache. Wrongly believing that a deciduous tooth cannot receive root canal treatment significantly reduced the option for conservative treatments, both when the disease was symptomatic and when it was not. [Al-Batayneh et al., 2019]. These results are the main findings of the current study.

This study classified treatment options as conservative or non-conservative. Dental filling and root canal treatment were considered conservative treatments because they allow restoring deciduous teeth affected by decay. When parents chose one of these options, they were manifesting their inclination towards preserving the teeth in good oral health, despite having not been informed of the clinical extent of the lesion or pulp involvement. Opting for a conservative treatment is indicative of the willingness of parents to search for dental care for their children. On the other hand, dental extraction and no treatment at all were considered non-conservative options. Tooth extraction is clearly a non-conservative option, irrespective of the clinical scenario, because parents are not entitled to judge by themselves whether or not a tooth is condemned. The option of not interfering was also considered as non-conservative, because parental negligence in seeking for dental care may

TABLE 2 Assessment of factors associated with the parental preference for a conservative treatment (dental filling or root canal treatment) in the case of asymptomatic dental caries (without a toothache) in the primary dentition of their children.

| Socio-demographic characteristics | Unadjusted analysis | | Adjusted analysis | |
|---|---|---|---|---|
| | PR (95% CI)* | P-value | PR (95% CI)* | P-value |
| Child's age | | | | |
| 2 years | 1.00 | | | |
| 3 years | 1.04 (0.94–1.17) | 0.430 | | |
| 4 years | 1.02 (0.91–1.14) | 0.773 | | |
| 5 years | 1.09 (0.98–1.22) | 0.102 | | |
| Family structure | | | | |
| Nuclear family | 1.00 | | | |
| Non-nuclear family | 0.977 (0.90–1.06) | 0.594 | | |
| Number of children | | | | |
| Up to 2 children | 1.00 | | 1.00 | |
| 3 or more children | 0.90 (0.81–0.99) | 0.042 | 0.90 (0.82–0.98) | 0.044 |
| Mother's age | 1.01 (1.00–1.02) | <0.001 | 1.05 (1.02–1.01) | 0.002 |
| Education of the mother | | | | |
| Up to 8 years of study | 1.00 | | 1.00 | |
| 9 or more years of study | 1.15 (1.08–1.23) | <0.001 | 1.09 (1.03–1.17) | 0.015 |
| Education of the father | | | | |
| Up to 8 years of study | 1.00 | | | |
| 9 or more years of study | 1.15 (1.07–1.23) | <0.0001 | | |
| Beliefs about the primary dentition | Unadjusted analysis | | Adjusted analysis | |
| | PR (95% CI)* | P-value | PR (95% CI)* | P-value |
| Do you believe that... your child has inherited your teeth? | | | | |
| Yes | 1.00 | | | |
| No | 1.03 (0.96–1.11) | 0.438 | | |
| primary teeth have roots? | | | | |
| Yes | 1.00 | | | |
| No | 0.96 (0.88–1.03) | 0.260 | | |
| primary teeth need dental treatment? | | | | |
| Yes | 1.00 | | | |
| No | 0.94 (0.81–1.08) | 0.388 | | |
| primary teeth may need root canal treatment (to remove the tooth nerve)? | | | | |
| Yes | 1.00 | | 1.00 | |
| No | 0.90 (0.84–0.97) | 0.004 | 0.93 (0.87–0.95) | 0.047 |
| using antibiotics causes tooth decay? | | | | |
| Yes | 1.00 | | | |
| No | 1.03 (0.95–1.11) | 0.523 | | |
| primary teeth can erupt decayed? | | | | |
| Yes | 1.00 | | | |
| No | 1.00 (0.93–1.08) | 0.932 | | |

** PR = Prevalence ratio; 95% CI = Confidence Interval.*

contribute to the progression of the disease.

The option of conservative treatments was preponderant in this study. However, a considerable proportion of parents chose non-conservative options in both clinical scenarios, and this option was even more prevalent when dental caries involved toothache [Al-Batayneh et al., 2019]. Despite advances in oral health prevention and treatment, dental caries in the primary dentition is largely prevalent in Brazil [Ardenghi et al. 2013] and worldwide [Pine et al. 2004; Kassebaum et al. 2015; [Rai and Tiwari, 2018; Arora et al., 2021; Pakkhesal et al., 2021], and many children still experience higher rates of dental treatment needs [Ardenghi et al., 2013; Pulache et al., 2016]. Therefore, acknowledging the persistence of a considerable proportion of parents manifesting their preference for non-conservative dental treatments represents a window of opportunity for public health programmes and interventions aimed at reducing the burden of dental disease in young children [Al-Batayneh et al., 2019].

As far as we know, this is the first study to associate parental preferences for different dental treatment approaches considering socio-demographic conditions and beliefs about the primary dentition. Previous studies on parental attitudes to the care of the carious primary dentition [Tickle et al., 2003; Popoola et al., 2013] have not assessed beliefs that may reduce the likelihood of parents searching for dental care. These studies concluded that the majority of parents would willingly leave the decision on treatment to the dentist. However, the dentist cannot decide if the patient is not visited, and young children depend on parents and caregivers to have access to dental care. Thus, parental preferences for the treatment of dental caries should be considered in dental treatment plan. Parental attitudes towards the dental care of their children can be advantageously assessed to instruct and plan health policy [Rai and Tiwari, 2018; Arora et al., 2021; Pakkhesal et al., 2021]..

Parents who believed that root canal treatment is not applicable to primary teeth were less likely to prefer conservative treatments in both clinical scenarios. Misinformation interferes

| Socio-demographic characteristics | Unadjusted analyses | | Adjusted analyses | |
|---|---|---|---|---|
| | PR (CI 95%)* | P-value | PR (CI 95%)* | P-value |
| Child's age | | | | |
| 2 years | 1.00 | | | |
| 3 years | 1.13 (0.97–1.32) | 0.112 | | |
| 4 years | 1.01 (0.86–1.19) | 0.877 | | |
| 5 years | 1.03 (0.87–1.22) | 0.746 | | |
| Family structure | | | | |
| Nuclear family | 1.00 | | | |
| Non-nuclear family | 0.87 (0.76–1.01) | 0.060 | | |
| Number of children | | | | |
| Up to 2 children | 1.00 | | | |
| 3 or more children | 0.90 (0.78–1.03) | 0.145 | | |
| Mother's age | 1.02 (1.01–1.03) | <0.001 | 1.04 (1.02–1.06) | 0.001 |
| Mother's levels of education | | | | |
| Up to 8 years of study | 1.00 | | 1.00 | |
| 9 or more years of study | 1.35 (1.21–1.50) | <0.001 | 1.25 (1.12–1.39) | <0.001 |
| Father's levels of education | | | | |
| Up to 8 years of study | 1.00 | | | |
| 9 or more years of study | 1.22 (1.10–1.35) | <0.001 | | |
| Beliefs about the primary dentition | Unadjusted analyses | | Adjusted analyses | |
| | PR (CI 95%)* | P-value | PR (CI 95%)* | P-value |
| Do you believe that... your child has inherited your teeth? | | | | |
| Yes | 1.00 | | | |
| No | 0.95 (0.86–1.06) | 0.382 | | |
| primary teeth have roots? | | | | |
| Yes | 1.00 | | | |
| No | 0.94 (0.84–1.05) | 0.303 | | |
| primary teeth need dental treatment? | | | | |
| Yes | 1.00 | | | |
| No | 1.09 (0.93–1.28) | 0.265 | | |
| primary teeth may need root canal treatment (to remove the tooth nerve)? | | | | |
| Yes | 1.00 | | 1.00 | |
| No | 0.81 (0.73–0.90) | <0.001 | 0.86 (0.77–0.95) | 0.003 |
| using antibiotics causes tooth decay? | | | | |
| Yes | 1.00 | | | |
| No | 1.05 (0.93–1.18) | 0.450 | | |
| primary teeth can erupt decayed? | | | | |
| Yes | 1.00 | | | |
| No | 1.01 (0.91–1.13) | 0.767 | | |

** PR = Prevalence ratio; 95% CI = Confidence Interval.*

TABLE 3 Assessment of factors associated with the parental preference for a conservative treatment (dental filling or root canal treatment) in the case of symptomatic dental caries (with a toothache) in the primary dentition of their children.

with their ability to decide and makes them more willing to deter conservative treatments. Furthermore, there is an association of inflammation of the periapical tissue in primary dentition with defects of permanent tooth enamel formation [Míšová et al., 2021]. Misinformed parents may delay the visit of their children to the dentist, aiming to avoid procedures which can be thought of as painful, unpleasant and expensive [Tamošiūnas et al., 2013]. Therefore, the planning of informative interventions in dental public health could improve the prospect of young children's oral health and preserve deciduous teeth until their natural exfoliation. Older and more schooled mothers were more likely to prefer conservative interventions in both clinical scenarios. These mothers may have received more information about oral health and the primary dentition. Being older and having attended school longer are conditions that may contribute to improving their ability to care for their children [Díaz et al., 2018; Rai and Tiwari, 2018; Al-Batayneh et al., 2019; Arora et al., 2021]. The fact that the education of the mother, not the father's, is associated with the outcome is emblematic because she is the one who usually spends more time with the small child and can rather influence decisions on dental care [Arora et al., 2021; Pakkhesal et al., 2021].

As regards treatment preferences for the asymptomatic caries lesion scenario, the parents with three or more children were less likely to prefer conservative treatments. Families with more kids may be under a heavier financial burden; they may be more stressed with multiple demands connected with healthcare. These reasons may explain why parents tended to opt out conservative treatments in this scenario. However, when it comes to considering the subsequent clinical scenario, which involves dental pain, this factor (having three or more children) did not remain statistically associated with a lower option for conservative dental treatments. The parents with three or more children who participated in this study showed, somehow, that they would not accept that their children were in pain. Furthermore, parents belonging to socio-economic middle/upper class had a proportionately higher number of children with caries rather than lower socio-economic classes [Colombo et al., 2019].

This study would have benefitted from further exploring parental preferences for dental treatment within more detailed clinical scenarios, involving other symptoms than solely dental

pain. A previous study reported that parents of younger children are more interested in a conservative treatment for aesthetically damaged incisors [Holan et al., 2009]. Indeed, dental treatment needs can be more easily detected by parents and caregivers in a decayed incisor than in a decayed molar. The previous experience of dental treatments received by the child is also relevantly correlated with parental preferences. Tickle et al. [2003] reported that parents of children who have already had a deciduous tooth extracted or filled were more willing to prefer conservative treatments. Moreover, Papoola et al. [2013] stated that the past experience of dental treatments that parents had themselves greatly influenced their choice of how treating their children. These remarks account for the main limitation of the present study. We were not able to perform clinical examinations in the children, and we feared that a more extensive self-administered questionnaire would increase the non-response rate for several questions.

## Conclusions

A non-negligible proportion of parents still prefers non-conservative treatments for dental caries in the primary dentition. This population segment should be targeted by informative interventions in dental public health. Older and more schooled mothers were more likely to prefer conservative treatments for dental caries in the primary dentition of their children, both when a toothache is or is not incident. Wrongly believing that root canal treatment is not applicable to deciduous teeth, reduced significantly the willingness for conservative treatments.

### Conflict of interest

The authors declare no conflict of interest.

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