Family context and incidence of dental caries in preschool children living in areas covered by the Family Health Strategy in Salvador, Bahia State, Brazil

Contexto familiar e incidência de cárie dentária em pré-escolares residentes em áreas do Estratégia Saúde da Família em Salvador, Bahia, Brasil

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Abstract

Psychosocial factors influence family care and can jeopardize child development. This study aimed to analyze the association between maternal common mental disorders and incidence of early dental caries in preschool-age children living in areas covered by the Family Health Strategy in Salvador, Bahia State, Brazil, in a cohort design. A total of 472 children were examined and their mothers were interviewed from 2007 to 2008. Incidence of at least one tooth with caries was 21.19%, while 7.84% of the children showed high risk of caries. The results after adjusting for the child's age and maternal schooling showed that maternal common mental disorders were associated with high caries risk in deciduous teeth (adjusted RR = 2.41, 95%CI: 1.05-5.56, among children with 6 or fewer home appliances in the household; adjusted RR = 3.44, 95%CI: 1.06-11.17, among those that brushed twice or less per day). Maternal mental problems were associated with the development of caries in preschoolers.

Family; Dental Caries; Preschool Child; Oral Health

Introduction

In early childhood, the family acts as the mediator between the child and society, providing the necessary care and stimuli for growth and development [1]. The family context is known to be characterized by a unique way of life, with material living conditions as well as daily and symbolic aspects that define the family's lifestyle [2]. Whatever its structure, the family represents the basic relational medium for the child's interactions with the world [3].

Family care for young children is defined as a set of practices by caregivers that impact the child's health and cognitive and psychological development [4]. Importantly, the principal caregiver in this phase of life is the mother [3,4], and adequate care in the home environment depends on the availability of resources like the caregiver's schooling and knowledge and physical and mental health, time, autonomy, social support, and financial resources.

Thus, the caregiver's schooling, knowledge, and beliefs represent her capacity to provide appropriate care to the developing child; her physical and mental health (including self-esteem and absence of stress and depression) are closely linked to her care-giving skill [4]. When maternal mental health is compromised, it can lead to emotional and behavioral problems in children [5], jeopardizing their cognitive develop-

ment [3] and reducing preventive care, including oral hygiene [6]. Maternal mental problems are also associated with chronic illnesses like asthma [7] and malnutrition in children [8].

Common mental disorders (CMD) are characterized by such symptoms as insomnia, irritability, fatigue, forgetfulness, difficulty concentrating, and somatic complaints. Such symptoms can lead to functional incapacity that is comparable to or even worse than chronically illnesses [9]. A study in Salvador, Bahia State, Brazil, showed 47.5% prevalence of any mental disorder in caregivers of children, with a predominance of anxiety disorders (32.8%), followed by mood disorders (26.1%), and substance abuse (10.1%) [10].

As for preschool health, dental caries is still a common disease of the deciduous dentition, of an infectious, multifactorial, and chronic nature. Early caries is defined as the presence of one or more decayed or restored tooth surfaces or extraction of any deciduous tooth in children 71 months of age or younger [11]. Early caries affects not only oral health, since compromised deciduous dentition increases the risk of caries in the permanent teeth, but also the child's physical, emotional, and cognitive development [11]. From the epidemiological perspective, caries was observed in 60% of Brazilian children at 5 years of age in 2004 [12], and in Salvador, only 50% of 5-year-old children were caries-free in 2005 [13].

Biological factors and behavioral attitudes related to the etiopathogenic mechanisms of early caries, like the presence of specific microorganisms, a sugar-rich diet, inadequate oral hygiene, and presence of enamel hypoplasias are well established [11]. Living conditions and psychosocial aspects of the family context can also contribute to the development of caries, including mental disorders [14,15,16,17,18] and cognitive factors [19]. Multivariate analyses and longitudinal studies on this topic are rare.

The current study aimed to analyze the association between maternal CMD and dental caries incidence in preschool-age children living in areas covered by the Family Health Strategy (FHS) in Salvador, considering the multiplicity of factors involved in this disease, including other aspects of the family context such as living conditions, behavioral attitudes, and family relations.

Methods

Study design

The current study is a prospective cohort conducted in a fixed population in five areas covered by Family Health Units (FHU) in the city of Salvador. Data were collected in two stages, the first from July to December 2007 (baseline) and the second (follow-up) from July to September 2008. Participants were preschool-age children (18 to 60 months age range throughout the study period) and their respective mothers or principal caregivers (in the absence of the mother as the principal caregiver).

Study population and area

The sample calculation used Statcalc from Epi Info version 6.04 (Centers for Disease Control and Prevention, Atlanta, USA), with dental caries as the outcome and family dysfunction defined as the presence of family alcoholism or maternal psychiatric disorder as the principal exposure variable, as in a previous study [16]. The following statistical parameters were used: 95% confidence interval, 80% power, 5:1 ratio between exposure and non-exposure, 5% caries prevalence among the unexposed, and relative risk of 3. The sample was calculated at 498 children 18 to 48 months of age in 2007, but with an additional 10% to compensate for possible losses, such that the final sample size was set at 548 individuals.

The study used two-stage sampling: the first stage, by convenience, allowed selecting the health districts in Salvador (divided into 12 districts) and their FHU, plus the simple random sampling that allowed selecting children 18 to 48 months of age in 2007 covered by the FHS, including individuals from this age bracket enrolled in the FHU. FHS coverage in Salvador was approximately 20% of the population in 2007. Children comprising the sample were pre-selected, and the study only included those that allowed performing the oral examination after voluntary authorization by the mother or guardian, using a signed free and informed consent form. When the selected child was not located at the home at the time of the first visit by the data collection team, two more visits were scheduled, and a new child was only selected after a third visit without locating the original child. Exclusion criteria consisted of children with aversion to oral examination and children with systemic diseases and/or anomalies of the dentition.

In order to allow health districts with different socioeconomic and epidemiological profiles to participate in this sampling process, districts were classified according to the methodology proposed by Oliveira [20], as described previously [21]. Four health districts with different socioeconomic profiles (classified according to schooling, basic sanitation, and infant mortality) were chosen according to the convenience

of the research group at the School of Dentistry, Federal University in Bahia (FOUFBA) involved in this study: Barra-Rio Vermelho, Brotas, Pau da Lima, and Subúrbio-Ferroviário, where the coverage area for a FHU in each health district represented a collection site (chosen by convenience), except in Subúrbio Ferroviário, where it was necessary to include two areas from two FHU to complete the sample size, defined on the basis of coverage of children in this study's age bracket by the Community Health Workers' Program and FHS. The health districts were classified in four socioeconomic categories [20], hence the choice of four districts, representing the four categories. The Subúrbio-Ferroviário district had a total of 16 FHU, Barra-Rio Vermelho had 3, and Paula da Lima and Brotas had only one FHU each in the year 2007.

Data source and collection

The first data collection stage took place in 2007, through home visits, with the participation of 11 teams, each consisting of two students (sixth semester or grater) from the Dentistry course at FOUFBA, who registered the data and performed the oral examinations, and Community Health Workers from the FHU areas. The teams were supervised by the group of dentist researchers in charge of the study. The second stage took place in 2008, with a minimum interval of six months between visits, and with eight teams participating. All teams participating in the two stages were trained to complete the questionnaire, and the examiners also underwent inter-examiner calibration before the data collection began and intra-examiner calibration through repetition of 10% of the examinations during collection. The study found statistical agreement rates for caries diagnosis greater than or equal to 95% and kappa statistic greater than or equal to 0.88 (95%CI: 0.72-0.95).

During the first stage, a questionnaire was applied to the children's mothers or caregivers (in cases of permanent absence of the former). The questionnaire included structured questions on: identification of the child and family members, socioeconomic characteristics, child's general health aspects, access to and use of dental services, oral hygiene, and eating habits. Maternal psychosocial characteristics, specifically presence of CMD, were also evaluated through the *Self-Report Questionnaire* (SRQ-20) [22]. This instrument was proposed by the World Health Organization (WHO) to detect suspected cases of psychiatric illness in the population and has already been translated and validated for the Portuguese language by Mari & Williams [23], who found a sensitivity of 85% and specificity of 80%. The questionnaire consists of 20 dichotomous questions (yes/no answers) related to CMD.

After the interview with the mothers, the children were examined for dental caries using a card with the deft and defs indices (mean number of decayed, missing, and filled deciduous teeth and surfaces) [24]. The oral examination performed in the home setting was preceded by brushing with a toothbrush and dentifrice by the same members of the data collection team. Brushing was performed in an area with the best possible light, with the child sitting, using an oral mirror and WHO periodontal probe. This procedure was adopted in the visits in 2007 and 2008, when the same children were reexamined, except in cases of refusal or migration, in order to assess caries incidence.

Data analysis

Two dependent variables were analyzed: dental caries incidence, measured as the occurrence of at least 1 new decayed deciduous tooth in an individual [25], and caries incidence in 3 or more teeth (high risk), representing the last tertile in the distribution of total number of new decayed teeth, considering the time between the first and second examinations. Caries incidence was defined as follows: the tooth was healthy at the first examination and "decayed", "missing", or "filled" at the second examination; or the deciduous tooth had not erupted at the first examination and was "decayed", "missing", or "filled" at the second examination.

The principal independent variable was the presence of maternal CMD, assessed by the SRQ-20 criteria [22], and exposure was defined as mothers/caregivers who answered affirmatively to eight or more questions on this questionnaire [23].

The covariables were classified in the category "Living Conditions", consisting of demographic and socioeconomic such as: child's age [less than 33 months (0), or 33 months or more (1) – evaluated as a potential confounder]; sex [female (0), or male (1) – evaluated as a potential confounder]; maternal schooling [complete secondary or more (0), or incomplete secondary or less (1) – evaluated as a potential effect modifier]; number of residents per room [up to 1 person (0), or more than 1 person (1) – evaluated as a potential effect modifier]; number of home appliances in the household [more than 6 (0), 6 or less (1) – evaluated as a potential effect modifier], in the category "Caries History", through the covariable presence/absence of prior caries [no (0), or yes (1) – evaluated as a potential confounder], and in the "Lifestyle" category, including covari-

ables related to behavioral attitudes and access to dental care, as: preventive or curative dental care [yes (0), or no (1) – evaluated as a potential confounder]; daily tooth brushing frequency [twice or more (0), or less than twice daily (1) – evaluated as a potential confounder]; nocturnal nursing [no (0), or yes (1) – evaluated as a potential confounder], and family relational covariables referring to maternal social support and mother-child relationship, including: maternal marital status [married or living with partner (0), or other status (1) – evaluated as a potential effect modifier], and presence of siblings in the child's age bracket [no (0), or yes (1) – evaluated as a potential effect modifier].

The data collection instruments were reviewed, and the data were keyed in with Epi Info, version 6.04. Data analysis used Stata 10 (Stata Corp., College Station, USA). An initial descriptive analysis of the target variables was performed. Next, stratified analysis was conducted for a preliminary evaluation of potential associations, estimating the crude associations (relative risks – RR – and confidence intervals – CI –, obtained by the Mantel-Haenszel statistic) between the independent variable and the dependent variables, as well as for the selected covariables. Potential effect modifiers were identified by verifying the difference in the estimated RR for each of the categories, at the statistically significant level (alpha = 0.05). The analysis of potential confounding variables showed whether they were associated simultaneously with the exposure among non-cases and with the outcomes among the unexposed, considering a relative difference greater than 10% between the adjusted and crude measures for each covariable, for identification of confounding. Together with elements from the theoretical model and the literature, this statistical procedure contributed to the selection of the covariables used in modeling the multivariate analysis.

The method used for the multivariate analysis was unconditional logistic regression and the strategy for obtaining RR was application of robust Poisson regression [26]. Statistical inference used 95%CI. The modeling procedure began with definition of the predictive model, based on the literature and the results of the stratified analysis. Interaction was analyzed using the backward modeling procedure [27]. Effect modifiers were identified through the statistically significant results for an alpha of 0.05 in the maximum likelihood test for the difference in the deviations between the saturated and reduced models, considering each dependent variable separately. Analysis of confounding used the backward procedure, comparing the measures of association and their respective confidence intervals for the saturated and reduced model. Covariables that produced a relative difference greater than 10% between the relative risks were considered confounders. Finally, the "best" models were obtained for estimating the RR that described the relationship between maternal CMD and caries incidence in 1 or more deciduous teeth and 3 or more teeth, controlled for effect modifiers and adjusted for confounders, with estimation of their 95%CI. After definition of the final logistic model, goodness of fit was calculated with the Hosmer-Lemeshow test.

Ethical issues

The study was submitted to and approved by the Institutional Review Board of the Institute of Public Health, Federal University in Bahia (Instituto de Saúde Coletiva, Universidade Federal da Bahia).

Results

This study included 472 preschool-age subjects (52.33% females), with age varying from 18 months at the beginning of the first data collection (mean 33 months, SD = 9.54) in 2007 to 60 months (mean 39 months, SD = 10.63) at the end of the second data collection in 2008. During the first wave, 528 children were examined and their mothers or principal caregivers were interviewed. Due to migration of families, during the second stage of the study, 472 (89.39%) children had their oral health reexamined, and there were no cases of refusal. This total represented 86.13% of the initially calculated sample size.

The children's biological mothers were the principal caregivers interviewed in this study (95.55%), and only in cases of permanent absence, other caregivers were interviewed, with maternal or paternal grandmothers representing all of these other cases (4,45%). The mothers' mean age was 27 years (SD = 6.39).

Mean caries incidence during the study period was 0.54 teeth (SD = 1.37). Caries incidence greater than or equal to 1 tooth occurred in 21.19% of the children, who had a baseline caries prevalence of 16.53%. A total of 7.84% of the children showed high risk of caries (in 3 or more teeth).

Prevalence of maternal CMD according to the SRQ-20 was 31.36%. As for living conditions, 43.86% of the children lived in households with 1 or more family member per room, 60.59% were children of mothers with incomplete secondary schooling or less, and 54.87% had 6 home ap-

pliances or fewer. As for lifestyle, especially family relational characteristics, 19.28% had siblings in the same age bracket, 69.70% of the mothers were married or living with a partner; and concerning the children's dental care and behavioral attitudes, 65.89% had never received any dental care, 42.16% were nursed at night, and 37.71% brushed their teeth less than twice a day.

Among children of mothers with suspected CMD, there were more boys than girls, and the majority were 33 months of age or older. The majority of these mothers had incomplete secondary schooling or less, had 6 or fewer home appliances, lived in homes with approximately 1 person per room, and were married or living with a partner. A major portion of these children did not have siblings in their same age bracket, had never received any dental care, brushed their teeth twice or more per day, were not nursed at night, and did not have dental caries (Table 1).

Analysis of bivariate association did not show statistically significant associations between maternal CMD and caries incidence in 1 or more deciduous teeth (RR = 1.08, 95%CI: 0.75-1.56) or 3 or more deciduous teeth (RR = 1.49, 95%CI: 0.80-2.79) (Tables 2 and 3).

In the stratified analysis of the principal association, considering both outcomes (caries incidence in 1 or more teeth and 3 or more teeth), the covariable "number of home appliances" acted as an effect modifier (Tables 2 and 3).

Multivariate analysis showed that the covariable "number of home appliances" acted as an effect modifier in the association between maternal CMD and caries incidence in 1 or more teeth, and that none of the covariables acted as a confounder. This analysis also showed that maternal CMD was not associated with incidence of dental caries in 1 or more deciduous teeth, even after adjusting for child's age and maternal schooling, while this adjustment was performed on the basis of the literature (adjusted RR = 1.42, 95%CI: 0.89-2.27 for households with 6 home appliances or fewer) (Table 4).

The covariables "number of home appliances" and frequency of daily brushing appeared as effect modifiers for the association between maternal CMD and caries incidence in 3 or more teeth, and none of the covariables behaved as a confounder of this association in the multivariate analysis. Still, due to the insufficient sample size, no models were generated that considered the interactions simultaneously. The results after adjusting for the child's age and maternal schooling (based on the literature) showed a positive association between maternal CMD and caries incidence in 3 or more deciduous teeth among children with 6 or fewer home appliances in the household (adjusted RR = 2.41, 95%CI: 1.05-5.56) (Table 5) and children that brushed less than twice a day (adjusted RR = 3.44, 95%CI: 1.06-11.17) (Table 6).

The goodness-of-fit tests showed a good fit between the data and models.

Discussion

The study's results showed that preschool-age children living in low-income areas covered by the FHS and whose mothers had common mental disorders showed high risk of developing early caries.

Although young children with adverse living conditions are subject to increased risk of developing caries, not all of them present this condition [19]. Recent studies have searched for the reasons, emphasizing psychosocial factors. Parental stress has been reported as a potential risk factor for caries in preschool children [14,17,18], and parents' and caregivers' cognitive characteristics have also been associated with caries in this group [19]. Other psychosocial factors, like alcohol abuse in the family and maternal psychiatric disorders have been associated with this condition [14,15,16]. Quiñonez et al. [18] also observed that severe early caries was associated with psychosocial alterations, as in the current study.

Biological and behavioral mechanisms that trigger early caries are well-established, related to colonization with *Streptococcus mutans*, immature enamel, hypoplasias, sugar intake, and inadequate oral hygiene [11]. Psychosocial factors represent a group of determinants that can influence the behavioral attitudes and biological mechanisms directly involved in the etiopathogenesis of early caries. This influence may occur through psychological processes, capable of interfering in the family's capacity to care for the developing child [6,16], or through biological processes, since psychosocial factors in the family setting can trigger stressful phenomena, resulting in immune alterations, like a reduction in the production of specific antibodies [18], which can contribute to the appearance of caries.

Mothers are the principal caregivers of children in the family context [3,4], and the adequacy of this care depends on their mental health [4]. Mental disorders frequently cause fatigue, reduce concentration and psychomotor capacity, trigger feelings of discouragement and self-neglect, and alter the positive interaction between mother and child [28]. Maternal mental problems are associated with a reduction in preventive parenting practices in the family environment, like inappropriate oral hygiene and inconsistent

Table 1

Characteristics of the study population according to presence of maternal common mental disorders (CMD). Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Covariables	Maternal CMD				p-value *
	Absent (n = 324)		Present (n = 148)		
	n	%	n	%	
Living conditions – demographic and socioeconomic covariables and caries experience					
Age (months)					
< 33	162	50.00	72	48.65	0.785
≥ 33 months	162	50.00	76	51.35	
Sex					
Female	176	54.32	71	47.97	0.200
Male	148	45.68	77	52.03	
Maternal schooling					
≥ complete secondary	139	42.90	47	31.76	0.022
≤ incomplete secondary	185	57.10	101	68.24	
Total home appliances					
> 6	156	48.15	57	38.51	0.051
≤ 6	168	51.85	91	61.49	
Number of household residents per room					
≤ 1	186	57.41	79	53.38	
> 1	138	42.59	69	46.62	0.413
Prior caries experience					
No	272	83.95	122	82.43	0.680
Yes	52	16.05	26	17.57	
Lifestyle – dental care access, behavioral, and relational covariables					
Dental care					
Yes	114	35.19	47	31.76	0.466
No	210	64.81	101	68.24	
Daily brushing					
≥ Twice	206	63.58	88	59.46	0.391
< Twice	118	36.42	60	40.54	
Nocturnal nursing					
No	193	59.57	80	54.05	0.260
Yes	131	40.43	68	45.95	
Maternal marital status					
Married/Living with partner	236	72.84	93	62.84	0.028
Other	88	27.16	55	37.16	
Siblings in child's age bracket					
No	259	79.94	122	82.43	0.524
Yes	65	20.06	26	17.57	
Caries incidence					
Caries incidence in 1 tooth or more					
No	257	79.32	115	77.70	0.690
Yes	67	20.68	33	22.30	
Caries incidence in 3 teeth or more					
No	302	93.21	133	89.86	0.210
Yes	22	6.79	15	10.14	

* p-value for the Mantel Haenszel chi-square test.

Table 2

Crude and adjusted relative risks (RR) according to target covariables between maternal common mental disorders (CMD) and caries incidence in 1 tooth or more in preschoolers and respective 95% confidence intervals (95%CI). Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Covariables	n	%	Caries incidence in 1 tooth or more	
			RR	95%CI
Crude association	472		1.08	0.75-1.56
Living conditions – demographic and socioeconomic covariables and caries experience				
Age (months)				
< 33	234	49.58	0.96	0.52-1.79
≥ 33	238	50.42	1.15	0.73-1.81
Adjusted association			1.07	0.74-1.55
Sex				
Female	247	52.33	1.03	0.60-1.74
Male	225	47.67	1.12	0.67-1.86
Adjusted association			1.08	0.74-1.56
Maternal schooling				
≥ Complete secondary	186	39.41	0.83	0.38-1.79
≤ Incomplete secondary	286	60.59	1.13	0.74-1.73
Adjusted association			1.04	0.72-1.51
Total home appliances				
> 6	213	45.13	0.67	0.34-1.29
≤ 6	259	54.87	1.48	0.92-2.37
Adjusted association			1.08	0.74-1.58
Number of household residents per room				
≥ 1	265	66.14	1.28	0.77-2.14
> 1	207	33.86	0.88	0.52-1.51
Adjusted association			1.07	0.74-1.54
Prior caries experience				
No	394	83.47	0.97	0.60-1.57
Yes	78	16.53	1.24	0.75-2.06
Adjusted association			1.06	0.74-1.51
Lifestyle – dental care, behavioral, and relational covariables				
Dental care				
Yes	161	34.11	0.84	0.41-1.75
No	311	65.89	1.81	0.77-1.82
Adjusted association			1.07	0.74-1.55
Daily brushing				
≥ Twice	294	62.29	1.09	0.69-1.72
< Twice	178	37.71	1.07	0.57-2.02
Adjusted association			1.09	0.75-1.57
Nocturnal nursing				
No	273	57.84	1.05	0.63-1.75
Yes	199	42.16	1.10	0.64-1.89
Adjusted association			1.07	0.74-1.56
Maternal marital status				
Married/Living with partner	329	69.7	1.30	0.82-2.04
Other	143	30.3	0.73	0.39-1.38
Adjusted association			1.05	0.73-1.52
Siblings in child's age bracket				
No	381	80.72	1.16	0.78-1.73
Yes	91	19.28	0.71	0.26-1.97
Adjusted association			1.08	0.74-1.56

Table 3

Crude and adjusted relative risks (RR) according to target covariables between maternal common mental disorders (CMD) and caries incidence in 3 teeth or more in preschoolers and respective 95% confidence intervals (95%CI). Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Covariables	n	%	Caries incidence in 3 tooth or more	
			RR	95%CI
Crude association	472		1.49	0.80-2.79
Living conditions – Demographic and socioeconomic covariables and caries experience				
Age (months)				
< 33	234	49.58	1.41	0.48-4.15
≥ 33	238	50.42	1.52	0.71-3.27
Adjusted association			1.48	0.79-2.77
Sex				
Female	247	52.33	1.34	0.56-3.21
Male	225	47.67	1.71	0.69-4.25
Adjusted association			1.5	0.80-2.83
Maternal schooling				
≥ complete secondary	186	39.41	1.69	0.52-5.52
≤ incomplete secondary	286	60.59	1.34	0.64-2.81
Adjusted association			1.43	0.76-2.68
Total home appliances				
> 6	213	45.13	0.63	0.19-2.14
≤ 6	259	54.87	2.46	1.08-5.62
Adjusted association			1.50	0.78-2.88
Number of household residents per room				
≤ 1	265	66.14	2.12	0.90-5.01
> 1	207	33.86	1.00	0.39-2.55
Adjusted association			1.48	0.79-2.76
Prior caries experience				
No	394	83.47	1.37	0.58-3.22
Yes	78	16.53	1.56	0.65-3.71
Adjusted association			1.46	0.79-2.67
Lifestyle – dental care, behavioral, and relational covariables				
Dental care				
Yes	161	34.11	1.39	0.43-4.51
No	311	65.89	1.53	0.73-3.20
Adjusted association			1.48	0.79-2.78
Daily brushing				
≥ Twice	294	62.29	1.04	0.47-2.30
< Twice	178	37.71	3.44	1.05-11.30
Adjusted association			1.52	0.81-2.87
Nocturnal nursing				
No	273	57.84	1.03	0.41-2.59
Yes	199	42.16	2.17	0.88-5.36
Adjusted association			1.49	0.79-2.81
Maternal marital status				
Married/Living with partner	329	69.7	1.74	0.84-3.62
Other	143	30.3	1.07	0.32-3.61
Adjusted association			1.52	0.81-2.83
Siblings in child's age bracket				
No	381	80.72	1.42	0.70-2.84
Yes	91	19.28	1.88	0.45-7.81
Adjusted association			1.49	0.80-2.79

Table 4

Crude and adjusted relative risks (RR) and respective 95% confidence intervals (95%CI) for the association between maternal common mental disorders (CMD) and caries incidence in 1 tooth or more in preschoolers, according to total number of home appliances in the household, based on robust Poisson regression, Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Maternal CMD	Total home appliances in household			
	> 6 (n = 213)		≤ 6 (n = 259)	
	RR	95%CI	RR	95%CI
Model 1 (Maternal CMD)				
Present	0.67	0.34-1.29	1.48	0.92-2.37
Model 2 (Maternal CMD, adjusted for child's age * and maternal schooling **)				
Present	0.65	0.34-1.26	1.42	0.89-2.27

* Covariable included in the modeling according to the categories: < 33 months (0), or ≥ 33 months (1);

** Covariable included in the modeling according to the categories: ≥ complete secondary schooling (0), or ≤ incomplete secondary (1).

Table 5

Crude and adjusted relative risks (RR) and respective 95% confidence intervals (95%CI) for the association between maternal common mental disorders (CMD) and caries incidence in 3 teeth or more in preschoolers, according to total number of home appliances in the household, based on robust Poisson regression, Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Maternal CMD	Total home appliances			
	> 6 (n = 213)		≤ 6 (n = 259)	
	RR	95%CI	RR	95%CI
Model 1 (Maternal CMD)				
Present	0.63	0.19-2.14	2.46	1.08-5.63
Model 2 (Maternal CMD, adjusted for child's age * and maternal schooling **)				
Present	0.62	0.18-2.10	2.41	1.05-5.56

* Covariable included in the modeling according to the categories: < 33 months (0), or ≥ 33 months (1);

** Covariable included in the modeling according to the categories: ≥ complete secondary schooling (0), or ≤ incomplete secondary (1).

discipline [6]; mothers with mental alterations show a reduction in their own oral health care, and this is related to more problems with the oral health of their children [29]; mothers' positive attitudes towards their own oral health and that of their children leads to less caries experience and periodontal disease, as well as to better oral hygiene habits [30]. Such psychological mechanisms, especially the neuroendocrine mechanisms triggering immune dysfunctions related to dental caries and resulting from psychosocial factors, still require more in-depth investigation [18].

It is difficult to compare the incidence of at least 1 decayed deciduous tooth according to this study (21.19%) with the results other studies, due to the scarcity of longitudinal studies on early caries, the difference in follow-up periods, and lack of standardization of indices and case definitions. In Salvador, Cabral [31] found a 22.6% incidence of new carious lesions in a cohort study following children up to 30 months of age in public and private daycare centers for some 9 months. Skeie et al. [32] observed a 40.1% incidence of new caries in children 3 to 5 years of age during two years of follow-up in Norway. As for caries experience in the children in our study, we found a baseline prevalence of 16.53%, similar to the results published by Declerk et al. [33] for

Table 6

Crude and adjusted relative risks (RR) and respective 95% confidence intervals (95%CI) for the association between maternal common mental disorders (CMD) and caries incidence in 3 teeth or more in preschoolers, according to daily brushing, based on robust Poisson regression. Salvador, Bahia State, Brazil, 2007-2008 (n = 472).

Maternal CMD	Daily brushing			
	≥ twice (n = 294)		< twice (n = 178)	
	RR	95%CI	RR	95%CI
Model 1 (Maternal CMD)				
Present	1.04	0.47-2.31	3.44	1.05-11.33
Model 2 (Maternal CMD, adjusted for child's age * and maternal schooling **)				
Present	0.93	0.41-2.11	3.44	1.06-11.17

* Covariable included in the modeling according to the categories: < 33 months (0), or ≥ 33 months (1);

** Covariable included in the modeling according to the categories: ≥ complete secondary schooling (0), or ≤ incomplete secondary (1).

Belgium (19.7%). In Brazil, surveys have shown more serious epidemiological situations: 27% of children 18 to 36 months of age and 60% of 5-year-olds presented caries [12]; in Salvador, Bahia, 50% of children at 5 years had at least one decayed deciduous tooth [13].

The influence of distal variables such as socioeconomic conditions on the development of early dental caries has been extensively researched, and this knowledge is now well-consolidated in the literature. Thus, low maternal schooling is an important risk factor for this condition [34,35,36]. Schooling is an important indicator of socioeconomic status, since it can be used for both sexes and for unemployed persons, besides displaying regular behavior over the course of life. High levels of schooling are predictors of better living conditions in general, like work and housing [34].

Family income, social class [34,35,36], and number of residents in the child's household [36] are also socioeconomic factors associated with caries in the deciduous dentition. In this study, maternal schooling and the number of residents in the household were investigated as potential modifiers of the principal association but were not proven as such. However, models were generated considering maternal schooling as a confounding variable, due to the accumulated knowledge concerning its importance for the target outcome, the child's caries incidence. However, the covariable "number of home appliances" demonstrated interaction with maternal CMD in the analyses of caries incidence, showing a positive and statistically significant association between maternal CMD and high caries risk in individuals with 6 or fewer home appliances in the household (Table 5). This finding reveals a synergism between the family's material conditions and maternal CMD, influencing the occurrence of childhood dental problems and demonstrating the distal impact of a socioeconomic indicator on the target outcome. This result also shows the importance of socioeconomic conditions for the determination of common mental disorders.

Studies indicate that the child's increasing age and male gender can increase the risk of caries [33]. Likewise, the literature shows that prior history of caries is an important predictor of future carious lesions in the deciduous and permanent dentition [37]. In this study, of a confirmatory nature, these factors did not appear as confounders for the target association. Even so, we presented results adjusted for the child's age, which did not differ from those obtained without adjustment (Tables 4, 5, and 6).

From the perspective of the family context, specifically behavioral attitudes, sugar-rich diet is known to be a proximal factor that directly affects the occurrence and progression of caries. The severity of caries in preschoolers is related to high sugar intake [37]. Oral hygiene, brushing frequency, and age at initiation of brushing are also significant predictors of caries prevention in deciduous teeth, and there is current recognition of the role of fluoride in dentifrices for the prevention and control of caries [37].

Nocturnal nursing, regardless of the content consumed (breast milk versus formula), reported by mothers in the first data collection wave, did not represent a confounder for the association between maternal CMD and caries incidence. However, daily frequency of brushing, also re-

ported by mothers during the interview, behaved as a modifier of this association. Maternal mental problems can interfere in their parenting capacity, in this case the children's oral hygiene, thereby increasing the risk of early caries.

Social support is one of the resources that foster quality of maternal care [4]. The absence of a husband/partner can mean a stressful element for the mother, acting as a risk factor for maternal depressive symptoms [38]. Presence of the husband/male partner also stimulates child development, which can be linked to the positive interference of his presence for performance of the maternal role [3]. In terms of other relational characteristics in the family context, small children whose birth order is third or greater and that live with smaller children than themselves show below-average cognitive performance [3]. The covariables maternal marital status and presence of siblings in the child's same age bracket did not modify the effect of the target association.

Few studies in dentistry have used a longitudinal design, especially research on preschool oral health. This study's cohort design allowed the use of incidence rates for early caries, representing one of its advantages over the majority of studies on this theme. It was thus possible to guarantee the temporal antecedence of maternal CMD in relation to the occurrence of caries. In addition, the choice of a random sample of children reduces the likelihood of selection biases in this study. The use of SRQ-20 [22] as an instrument that detects mental disorders, already validated and used in population surveys, may have avoided classification errors for mothers with CMD.

The study's limitations include the final sample size, smaller than the original calculation, which may have influenced the findings. Thus, the study's power may have been insufficient to detect positive associations between maternal CMD and incidence of at least 1 new decayed tooth, or to identify confounders and other modifiers of the principal association and allow simultaneous control of the two observed effect modifiers.

Final remarks

Early caries incidence suffers the influence of psychosocial factors, specifically maternal CMD, which interfere directly in parenting capacity in the family context. Material living conditions and behavioral attitudes related to oral health acted as mediators of this relationship in this confirmatory analysis. This reinforces the need for changes in oral health practices by health services in order to make them more comprehensive, avoiding normative educational interventions based on recommendations to adopt non-cariogenic habits, which fail to contribute effectively to changing the epidemiological situation in the pediatric population. Furthermore, mental health is a problem that merits more in-depth investigation and management by primary healthcare services in Brazil, given that its effects reach not only the individual child, but also the development and health of family members, especially those that depend on caregivers with mental disorders.

Resumo

Fatores psicossociais influenciam o cuidado no contexto familiar, podendo prejudicar o desenvolvimento infantil. Este trabalho teve como objetivo analisar a associação entre transtornos mentais comuns maternos e a incidência de cárie precoce em crianças na faixa etária pré-escolar, residentes em áreas cobertas pelo Estratégia Saúde da Família em Salvador, Bahia, Brasil, em um estudo de coorte. Foram examinadas 472 crianças, e suas mães foram entrevistadas, no período de 2007 a 2008. A incidência de pelo menos 1 dente cariado foi de 21,19%, enquanto 7,84% das crianças apresentaram alto risco de cárie. Os resultados após ajuste por idade da criança e escolaridade materna mostraram que transtornos mentais comuns maternos associaram-se ao alto risco de cárie em dentes decíduos (RR ajustado = 2,41, IC95%: 1,05-5,56, entre as crianças com 6 ou menos eletrodomésticos no domicílio; RR ajustado = 3,44, IC95%: 1,06-11,17, entre as que realizavam escovação menos de 2 vezes ao dia). Os problemas mentais maternos relacionam-se com o desenvolvimento da cárie em pré-escolares.

Família; Cárie Dentária; Pré-Escolar; Saúde Bucal

Contributors

T. F. Almeida, M. I. P. Vianna, M. B. B. S. Cabral, M. C. T. Cangussu, and F. R. Floriano participated in the study's conceptualization, methodology, and fieldwork and writing of the article.

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