

Social aspects of dental caries in the context of mother-child pairs

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ABSTRACT

The relationship between mother and child in the context of oral health has traditionally been exposed by the scientific literature in microbiology, which lacks a broad and necessary discussion of health and illness seen as processes, both biological and social. Objective: Investigate the family social determinants associated with the caries history of children and the need for dental treatment (NDT) among their mothers was the objective of this study. Material and Methods: This research employed a cross-sectional study of mother-child pairs living in southern Brazil. Data collection occurred in public institutions of early childhood education. The instruments included a structured questionnaire administered to mothers and clinical oral examinations of the mothers and children. The social variables considered were marital status, maternal education, number of children, income, employment status, and frequency of visits to a dental professional. The measured outcomes were the maternal NDT and child caries history. Data were analyzed by the chi-square test (χ^2) and by discriminant analysis. Results: The final sample consisted of 272 mother-child pairs and it was found that the greatest need for treatment was among mothers with low educational level and low family income who rarely or never visited a dentist. Tooth decay was less frequent in only child, and most frequent in children of mothers with low educational attainment, and in children in lower income households who rarely or never visited the dentist. The social determinants of caries in children and of the maternal NDT were similar. It follows that the maternal NDT and caries history among children were strongly associated with maternal education ($p < 0.0001$), household income ($p < 0.0001$), and frequency of visits to a dental professional (0.0018). Caries history among children was also associated with number of children in the household ($p < 0.0001$). Conclusions: The results suggest that the caries experience in children depended less on the family social variables than on the maternal NDT.

Keywords: Social conditions. Risk factors. Dental caries. Oral health. Mother-child relations.

INTRODUCTION

Dental caries have been described as a social disease, as their formation is associated with biological, dietary, behavioral, and socioeconomic factors, as well as access to consumer goods and health services¹³. Although the prevalence and severity of dental caries has decreased among Brazilian children and adolescents in the last two decades, expanding preventive resources to

reach all communities and social strata remains challenging².

Numerous studies have addressed the correlation between oral health and social factors such as income, education, number of children, and other variables^{12,16,21,22,25,31}. The national surveys conducted in Brazil in 2000 and 2010 showed that oral health is heterogenous, with differences found among regions and social groups. Socially deprived populations were at particular risk of severe dental

disease^{5,6}.

Social changes ultimately lead to changes within the family. Increasingly, women are considered as the reference person in the family. In this scenario, the mother assumes a central role in the formation, transmission, and environmental conservation and social development of other family members, especially her children²⁴. It is therefore likely that the health of both the mother and child are similar or are linked to social determinants, given that they live in the same social context.

The purpose of the present study was to investigate the family social determinants associated with the caries history of children and the need for dental treatment (NDT) among their mothers.

MATERIAL AND METHODS

Study design and sample population

A cross-sectional study was performed among children (age: 1–5 years) enrolled in ten public schools in southern Brazil and their mothers. The initial design of this study was approved by the Ethics Committee of the Faculty of Dentistry of Araçatuba (FOA Case 2006-01460) in accordance with the Declaration of Helsinki. An initial probability sample of 360 individuals was selected to participate. A

sample size calculation was performed using Epi Info 6.0 considering a range of 95% and a 5% margin of error over the total population size for the study. Because the numbers of children enrolled in each school proved to be very similar, the samples were not stratified according to this parameter. At the end of this process, 13 groups of children distributed among ten schools were selected. Each of the schools gave their consent to participate in this study.

Data acquisition

Data were collected by a single researcher, who was previously trained and standardized. The structured instrument used for this study was previously validated by a pilot study and it consists of three distinct parts. The first part addresses the family social characteristics, including the maternal education level, employment status, average monthly income, age, marital status, number of children, and frequency of visits to the dentist. The second part assesses the NDT of the mother (maternal NDT), according to the presence of dental caries determined by oral examination³⁴. The third part assesses whether the child has a history of or has current untreated dental caries, based on oral examination.

Table 1- Association between socioeconomic status and need for dental treatment (NDT) in mothers of 272 children enrolled in public institutions of early childhood education in southern Brazil

Socioeconomic variable		Mothers with NDT	Mothers with NDT (%)	Mothers w/o NDT	Mothers w/o NDT (%)	p-value**
Marital status	Unmarried	27	10%	28	10%	0.695
	Married	117	43%	100	37%	
No. of children	1 child	102	38%	96	35%	0.404
	>1 child	43	16%	31	11%	
Education level	Basic	97	36%	41	15%	<0.0001
	Fundamental	34	13%	7	3%	
	High School	14	5%	75	28%	
	Higher ed.	0	0%	4	1%	
Employment	Yes	141	52%	119	44%	0.261
	No	4	1%	8	3%	
Income	<BMMW*	103	38%	45	17%	<0.0001
	1-3× BMMW*	42	15%	31	11%	
	>3× BMMW*	0	0%	51	19%	
Frequency of visits to a dentist	Never	79	29%	44	16%	0.0018
	Rarely	52	19%	64	24%	
	1×/year	14	5%	14	5%	
	>1×/year	0	0%	5	2%	

* Brazilian minimum monthly wage (BMMW) ~ \$465.00 BRL (U.S. \$258.00)

** X² test

Oral examinations of the mother-child pairs were performed at the ten schools. Examinations were performed under artificial light, and included the use of exploratory probes, mirrors, clinical plans, wooden spatulas, and sterile pads.

The initial group of mother-child pairs was subdivided into four groups based on the oral examination results. Group 1 (G1) included pairs with a maternal NDT and a child with caries history. Group 2 (G2) included pairs with no maternal NDT and a child with caries history. Group 3 (G3) included pairs with a maternal NDT and a caries-free child. Group 4 (G4) included pairs with no maternal NDT and a caries-free child.

Data analysis

The diagnostic intra-rater concordance was determined by the Kappa test ($K=0.98$). The association between categorical variables (marital status, number of children, maternal education level, employment status, income, and frequency of visits to the dentist) and the variables (maternal NDT and child caries history) was analyzed using the chi-square test (χ^2). Statistical significance was defined at the 5% level. Multivariate discriminant analysis (MDA) was performed for the four groups by assessing the proximity-distance space between

them, considering all of the social variables together. All tests were performed using the statistical software BioStat 5.0.

RESULTS

The final sample consisted of 272 mother-child pairs. The loss of individuals from the sample was due to the refusal of mothers to participate ($n=67$) or the absence of the child at the time of clinical examination ($n=57$). Most of the mothers were married (79.8%, $n=217$). In only 74 pairs (27.2%), the child was the firstborn. Most mothers (50.7%, $n=138$) had only basic education, emphasizing the low education of the population considered. Only 4 mothers (1.5%) had completed higher education, 89 (32.7%) had completed high school, and 41 (15.1%) had completed primary education. The vast majority (95.6%; $n=260$) were currently employed, although the average family income was low. Of the 272 mother-child pairs, 148 (54.4%) earned less than the Brazilian minimum monthly wage, 73 (26.8%) earned 1–3× the minimum wage, and only 37 (13.6%) earned >3× the minimum wage. Mothers reported visiting a dental professional never (45.2%, $n=123$), rarely (42.6%, $n=116$), once a year (10.3%, $n=28$), or more than

Table 2- Association between maternal socioeconomic variables and caries history of children enrolled in public institutions of early childhood education in southern Brazil

Socioeconomic variable		Children w/ caries history	Children w/ caries history (%)	Children w/o caries history	Children w/o caries history (%)	p-value**
Marital status	Unmarried	43	16%	11	4%	0.053
	Married	141	52%	77	28%	
No. of children	1 child	120	44%	78	29%	<0.0001
	>1 child	64	24%	10	4%	
Education level	Basic	138	51%	0	0%	<0.0001
	Fundamental	39	14%	2	1%	
	High school	7	3%	82	30%	
	Higher ed.	0	0%	4	1%	
Employment	Yes	174	64%	86	32%	0.383
	No	10	4%	2	1%	
Income	<BMMW*	148	54%	0	0%	<0.0001
	1-3× BMMW*	36	13%	37	14%	
	>3× BMMW*	0	0%	51	19%	
Frequency of visits to a dentist	Never	113	42%	10	4%	<0.0001
	Rarely	55	20%	61	22%	
	1×/year	16	6%	12	4%	
	>1×/year	0	0%	5	2%	

N=272. Note: Brazilian minimum monthly wage (BMMW) ~ \$465.00 BRL (U.S. \$258.00)

once a year (1.8%, n=5).

We next examined the association between socioeconomic variables and the maternal NDT (Table 1) or the caries history of the child (Table 2). The maternal NDT was positively associated with low maternal educational attainment, a monthly household income of less than the minimum wage, and infrequent (never or rare) visits to the dentist. The caries history of children with a maternal NDT was positively associated with a lower family income, lower maternal educational attainment, low frequency of visiting a dentist (never or rarely), and a higher number of children in the family.

In order of frequency, the mother-child pairs largely belonged to G1 (49.9%; maternal NDT and child caries history) or G4 (29.2%; no maternal NDT and caries-free child), followed by G3 (18.0%; no maternal NDT and child caries history) and distantly by G4 (3.6%; maternal NDT and caries-free child) (Table 3).

Table 3- Distribution of the children in each of the four NDT groups

Groups	n	%
G1	134	49.2
G2	49	18
G3	10	3.6
G4	79	29.2
Total	272	100

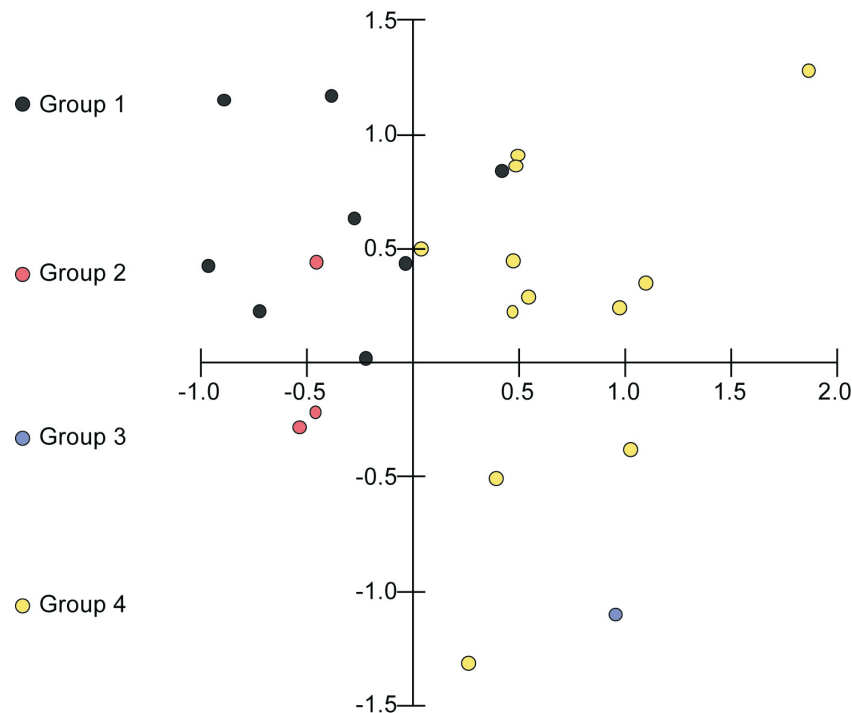


Figure 1- Spatial discrimination analysis of groups G1, G2, G3, and G4 according to the maternal need for dental treatment and the caries history of the child. Population sample is children attending public institutions of early childhood education in southern Brazil and their mothers

Figure 1 shows the spatial relationship between the four groups. G1 and G2 were very close, G4 was more widespread, and G3 was substantially smaller and further away from the others. The finding indicates that all of the social variables must be evaluated together. G1 and G2 have greater similarity in their variables and these are more concentric. G4 has greater range in the variables, while the variables in G3 are very different from the others.

DISCUSSION

In the present study, it was found that the maternal NDT was associated with lower family income, maternal education level, and fewer visits to the dentist. Similar variables were also associated with the caries history of the children. Only child was less likely to have a history of caries. Moreover, the caries history of the child was less dependent on the social variables than on the maternal NDT, as children with or without caries were part of families with closer behavior.

The health conditions of a population, including oral health, are historically associated with social determinants. Several studies have identified an association between oral health and socioeconomic variables such as family income^{9,12,20}, educational level^{12,22}, delay and disruption of the education of the child⁷ and social class^{16,23,33}, in various locations including Australia¹⁷, New Zealand²⁸, Jordan²⁹, Japan³¹, Sweden¹⁹, the UK¹⁰ and Brazil^{8,11,27,30}.

It was observed that the maternal NDT was positively associated with low family income, low maternal education level, and infrequent visits to the dentist. The maternal NDT was not correlated with the number of children or the maternal marital or employment status. Interestingly, the child caries history was associated with the same variables as the maternal NDT, along with the number of children. Caries history was less likely in children who were the only child. The results of this study partly confirm the results of Galindo, et al.¹⁴ (2005), who demonstrated a relationship between the number of children and a higher rate of dental caries and maternal NDT. However, the number of children seems to be less important than the education level of the parents or the family income. Because the maternal NDT and child caries history were associated with the same variables, a relationship seems to exist between the oral health statuses of the mother and child. Fadel, et al.¹¹ (2008) also suggested a strong relationship between the maternal NDT and the caries history of children in a previous survey conducted in southern Brazil.

Socioeconomic determinants of pediatric oral health have been examined by several previous researchers. Auad, et al.³ (2009), Peres, et al.²⁶ (2005) and Borges, et al.⁴ (2012) examined populations of 12, 6 and 4–6 year old children, respectively, and showed that better family economic conditions and higher levels of maternal education were associated with fewer episodes of caries. Oliveira, et al.²³ (2008) found that low maternal educational attainment (<8 years of schooling) and low family economic status were associated with increased incidence of dental caries in preschool children. Other determinants of oral health may also exist in addition to those tested here. In addition, in some regions the social determinants are less pervasive. A longitudinal study of risk factors for dental caries in infants in the United States identified only previous colonization by *Streptococcus mutans* and early consumption of sugars as risk factors. Social variables did not increase the caries risk³².

Among the mothers surveyed, 123 indicated that they had never consulted a dentist. The lack of access to dental care in this study was far greater than the Brazilian average for adults⁵. Goettems, et al.¹⁵ (2012), also in a cross-sectional study of 608 mother-child dyads, observed high association between irregular visits to a dentist by the mother and no dental visit by the child. The maternal oral health and number of visits to the dentist, which suggest barriers to oral health care access, are also reflections of socioeconomic conditions. Alexandre, et al.¹ (2006) found that the need for dental treatment, represented specifically by toothache, was associated with absent routine dental care.

Preventive visits to the dentist and local availability of dentists have been shown to be crucial to caries prevention¹⁸.

While numerous studies have revealed an association between socioeconomic status and caries history or NDT, virtually no studies have demonstrated this association considering all socioeconomic variables together. In this study, when analyzing all of the social variables, it was found that the theoretically worst oral care condition (G1; maternal NDT and child with caries history) was in close proximity to G2 and was further away from G3 and G4. G2 was more inserted in the space of G1 and G3, indicating that G1 and G2 have greater similarity of social variables than G1 and G3. In other words, the NDT depended on larger social changes more than dental caries, because G3 (maternal NDT with non-caries child) was spatially further away.

CONCLUSION

The NDT in mother was associated with lower family income, low maternal education level and fewer visits to the dentist. Similarly, the variables income, maternal education and visits to the dentist were excessively associated with caries experience in this order. The only children presented less caries experience. Furthermore, the caries experience in child depends less from social oscillation than to maternal NDT, because the children with and without caries experience were part of families with closer social profiles.

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