ALINE SAMPIERI TONELLO

IMPACTO DE VARIÁVEIS SOCIAIS E TENDÊNCIA DE CÁRIE E FLUOROSE DENTÁRIA EM ESCOLARES DE 12 ANOS DE IDADE EM DUAS CIDADES DO SUDESTE BRASILEIRO

Tese apresentada à Faculdade de Odontologia de Piracicaba, da Universidade Estadual de Campinas, para a obtenção do Título de Doutor em Odontologia. Área de concentração em Saúde Coletiva.

Orientador: Prof. Dr. Marcelo de Castro Meneghim

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A Comissão Julgadora dos trabalhos de Defesa de Tese de Doutorado, em sessão pública realizada em 08 de Fevereiro de 2010, considerou a candidata ALINE SAMPIERI TONELLO aprovada.

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RESUMO

O presente trabalho, composto por dois estudos teve como objetivos: a) descrever as prevalências de cárie e fluorose dentária em escolares de 12 anos de idade de Piracicaba/SP e Iracemápolis/SP, Brasil, 2007 e comparar estes dados com outros levantamentos epidemiológicos realizados anteriormente, em Piracicaba para a cárie dentária (1971-2005) e para a fluorose dentária (1991-2001) e em Iracemápolis para a cárie e fluorose dentária (1991-2004); b) avaliar a experiência de cárie e a prevalência de fluorose dentária em escolares de 12 anos de idade de Piracicaba/SP, Brasil, 2007 e verificar a relação entre essas alterações e os fatores socioeconômicos e variáveis comportamentais relacionadas com a saúde bucal. A amostra constituiu de 724 escolares provenientes de escolas públicas e privadas de Piracicaba/SP e 197 escolares provenientes de escolas públicas de Iracemápolis/SP. Os exames foram realizados por um examinador previamente calibrado, no pátio das escolas, sob luz natural, com auxílio de espelho bucal plano, sonda IPC e escovação prévia, seguindo as recomendações da OMS. A cárie dentária foi avaliada utilizando os índices CPOD e SiC (Significant Caries Index), e a fluorose pelo índice T-F. As variáveis socioeconômicas (renda familiar, número de residentes na mesma casa, escolaridade do pai e da mãe e habitação) e as informações comportamentais foram obtidas por meio de um questionário semi estruturado enviado aos pais. A associação entre as variáveis dependentes (CPOD e fluorose) e as variáveis independentes (variáveis socioeconômicas e comportamentais) foi determinada por meio de análise de regressão logística múltilpa. O CPOD médio foi de 0,85 (dp=1,54) e 1,02 (dp=1,61) e o índice SiC de 2,52 (dp=1,72) e 2,83 (dp=1,60) em Piracicaba e Iracemápolis, respectivamente. A prevalência de fluorose foi de 29,4% e 25,4% em Piracicaba e Iracemápolis, respectivamente. Comparando o presente estudo com outros levantamentos realizados anteriormente, foi observada uma significativa redução da experiência de cárie em ambas as cidades, (90,12%) em Piracicaba e 85,07% em Iracemápolis ($p<0,01$). Com relação à prevalência da fluorose dentária, verificou-se um aumento de 44,1% em Piracicaba, observando uma menor prevalência entre alguns anos. Já em Iracemápolis, o aumento foi de 1170%. Com base no modelo de regressão logística múltipla, as crianças pertencentes a uma família com renda mensal inferior ou igual a quatro salários mínimos apresentaram

2,58 vezes mais chances de terem cárie (CPOD>0) do que aquelas pertencentes a uma família com renda mensal superior a quatro salários mínimos. Além disso, aquelas crianças que consultaram ao dentista apresentaram 4,27 vezes mais chances de serem diagnosticadas ou tratadas em relação à cárie do que aquelas que nunca foram ao dentista. Porém, em relação à fluorose, o modelo de regressão logística não foi significativo. Em conclusão, os resultados desta tese demonstraram uma contínua redução da experiência de cárie em ambas as cidades no decorrer dos anos. Em relação à fluorose dentária, verificou-se uma tendência de estabilização em Piracicaba, porém em Iracemápolis, observou-se um aumento constante. Adicionalmente, observou-se uma associação entre a presença de cárie e renda familiar mensal, como também entre cárie e consultas ao dentista. Entretanto, em relação à fluorose dentária, nenhuma das variáveis testadas foi associada com esta alteração.

Palavras-chave: Cárie dentária, fluorose dentária, fator socioeconômico, variáveis comportamentais.

ABSTRACT

The present study was composed by two papers which aims were: a) to describe the prevalence of dental caries and dental fluorosis in 12-years-old schoolchildren from Piracicaba/SP and Iracemápolis/SP, Brazil, 2007 and to compare current prevalence rates with those from previous epidemiological surveys developed in Piracicaba, for dental caries (1971-2005), and for dental fluorosis (1991-2001) and in Iracemápolis for dental caries and dental fluorosis (1991-2004); b) to evaluate the caries experience and dental fluorosis prevalence in 12-years-old schoolchildren from Piracicaba/SP, Brazil, 2007 and to verify the relationship between these trends, socioeconomic factors, and behavioral variables related to oral health. The sample consisted of 724 schoolchildren from public and private schools from Piracicaba/SP and 197 schoolchildren from public schools from Iracemápolis/SP. Examinations were executed by a previously calibrated examiner, in outdoor settings, under natural light, using dental mirror, CPI probe, and previous tooth brushing, followed the WHO recommendations. Dental caries was measured by DMFT and SiC (Significant Caries Index) indexes and dental fluorosis by T-F index. Socioeconomic variables (monthly income, number of residents in home, mother's and father's education and home ownership) and behavioral information were collected by means of a parental semi structured questionnaire. Then multiple logistic regression analyses using the stepwise procedure were performed in order to verify the relationship among the dependent variables (DMFT and fluorosis) and the independent variables (socioeconomic and behavioral variables). The mean of DMFT was 0.85 (SD=1.54) and 1.02 (SD=1.61) and the SiC Index was 2.52 (SD=1.72) and 2.83 (SD=1.60) in Piracicaba and Iracemápolis, respectively. The fluorosis prevalence was 29.4% and 25.4% in Piracicaba and Iracemápolis, respectively. Comparing the present study to another previous epidemiological surveys, in both towns, a significant caries reduction of 90.12% (Piracicaba) and of 85.07% (Iracemápolis) ($p<0.01$), have been observed. Concerning dental fluorosis prevalence, an increase of 44.1% was noted in Piracicaba, where a small prevalence was observed throughout the years. Although, the increase was 1170% in Iracemápolis. By means of multiple logistic regression model, children, whose family earned up to four minimum wages, were 2.58 more prone to have caries (DMFT>0) than those whose family earned over four minimum

wages. Besides, those children who visited the dentist were 4.27 more prone of being diagnosed with dental caries and receive treatment in comparison to those who never had visited the dentist. However, for fluorosis prevalence the multiple logistic regression model was not significant. In conclusion, the results of this thesis demonstrated continuous decrease in dental caries experience in both Brazilian towns. Concerning dental fluorosis, stabilization trends were observed in Piracicaba. In Iracemápolis, however, a constant increase was noted. Moreover, significant associations between the presence of dental caries and monthly family income, as well as between dental caries and visiting to the dentist, were observed. However, in relation to dental fluorosis, no tested variable was associated with the disturb.

Key-words: Dental caries, dental fluorosis, socioeconomic factors, behavioral variables.

SUMÁRIO

INTRODUÇÃO

A cárie dentária é uma doença multifatorial resultante de um distúrbio no equilíbrio entre o dente e a microbiota presente no biofilme dental (Skeie *et al*., 2006). Para a obtenção de dados relativos à cárie dentária, os levantamentos epidemiológicos nacionais e internacionais em saúde bucal utilizam o índice CPOD (média dos dentes cariados, perdidos e obturados) proposto por Klein e Palmer (1937), o qual, expressa o número de dentes permanentes atacados por cárie. Este índice é amplamente indicado para avaliar a doença cárie dentária em escolares de 12 anos de idade, considerada como a idade de monitoramento global da cárie para comparações internacionais e o acompanhamento das tendências da doença (OMS, 1999).

Na última década, um declínio da prevalência de cárie dentária, principalmente na faixa etária de 12 anos, tem sido observado no mundo todo (Irigoyen e Sanchesz-Hinojosa, 2000; Pitts et al., 2002; Bonecker e Cleaton-Jones, 2003; Pieper e Schulte, 2004; Bastos *et al.*, 2005; Meneghim *et al.*, 2006; Pereira *et al.*, 2007; Tagliaferro *et al.*, 2008a).

De acordo com diversos estudos, a redução da cárie vem sendo observada também no Brasil, tanto em áreas fluoretadas como não fluoretadas, principalmente em escolares residentes na região Sul e Sudeste do país (Freysleben *et al.*, 2000; Narvai *et al*., 2000; Pereira *et al*., 2000; Bastos *et al.*, 2004).

O fluoreto é considerado mundialmente como o agente mais efetivo para a prevenção e controle da cárie dentária, sendo empregado de diferentes maneiras, tais como na água de abastecimento público, em soluções tópicas e nos dentifrícios (Pereira *et al*, 2001; Cury *et al.*, 2004).

Alguns autores relatam que o amplo uso dos fluoretos, em particular, o adicionado à água de abastecimento público e aos dentifrícios, a redução do consumo de açúcar e a implementação de ações de cunho preventivo e educativo pelos serviços odontológicos são os principais responsáveis pela redução da prevalência de cárie (Bratthall, 1996; Krasse, 1996; Pereira *et al.*, 2001; Cury *et al*., 2004; Narvai *et al*., 2006). Um recente estudo realizado com escolares de 12 anos de idade da Lituânia, também observou um declínio na experiência de cárie, associado com uma melhora da higiene bucal e com o uso de dentifrício e água fluoretados (Milčiuvienė *et al*., 2009).

Paralelamente ao declínio da experiência de cárie vem sendo observados outros eventos, como a progressão mais lenta das lesões de cárie (Hintze, 2001; Rugarabamu *et al*., 2002; Moberg Skold *et al*., 2005), a concentração de novas lesões em superfícies oclusais (Warren *et al*., 2002; Campain *et al*., 2003; Batchelor & Sheiham, 2004; David *et al*., 2006) e a polarização da doença em grupos de risco, (Burt, 1998; Seppä, 2001; Tickle, 2002; Narvai *et al.*, 2006). De fato, cerca de 80% das superfícies dentais cariadas estão concentradas em aproximadamente 25% a 30% das crianças e adolescentes (Poulsen & Scheutz, 1999; Pereira *et al*., 2007).

Com base neste fato, o índice SiC (Significant Caries Index) foi proposto em 2000, com o objetivo de dar atenção a estes indivíduos do grupo polarizado (Bratthall, 2000). Este índice é calculado por meio da média dos dentes cariados, perdidos e obturados para 1/3 dos indivíduos examinados que possuem os mais altos escores de cárie, o chamado grupo polarizado. Alguns estudos têm utilizado este índice concomitantemente ao o índice CPOD, demonstrando que este grupo polarizado apresenta mais do que o dobro da experiência de cárie em relação ao restante da amostra (Nishi *et al.*, 2002; Tayanin *et al.*, 2002).

Por outro lado, ao mesmo tempo em que se observa a diminuição da experiência de cárie, verifica-se um aumento na prevalência de fluorose em várias localidades do mundo (Fomon *et al*., 2000; Beltran-Aguilar *et al.*, 2002, Browne *et al.*, 2005; Meneghim *et al.*, 2006). Este aumento também vem sendo observado em alguns estudos longitudinais no Brasil, os quais objetivam focar no contínuo monitoramento da fluorose dentária (Maltz *et al*., 2000; Pereira *et al*., 2000).

A fluorose dentária é conceituada como uma deficiência na mineralização do esmalte dos dentes devida à ingestão diária e excessiva de fluoreto durante o desenvolvimento dental (Aoba and Fejerskov, 2002). Para o diagnóstico e a determinação do grau de severidade da fluorose dentária, diversos índices têm sido utilizados, destacando-se entre eles o T-F (Thylstrup & Fejerskov, 1978), o qual classifica a fluorose dentária em nove graus de severidade, e se propõe a precisar diferentes categorias de comprometimento do esmalte dentário nas formas mais graves. Costuma ser mais indicado para populações com altas exposições a fluoretos ou alta prevalência deste agravo (Fejerskov, 1994).

As discussões sobre os benefícios da redução da experiência de cárie e o aumento da prevalência de fluorose relacionadas com a exposição ao íon flúor são extensas. De acordo com alguns estudos, um possível aumento na quantidade ingerida de flúor em decorrência de maior exposição a diferentes métodos, especialmente de dentifrícios fluoretados por crianças de baixa idade e que ingerem também água fluoretada, pode determinar a ocorrência da fluorose dentária (Wang *et al.*, 1997; Pendrys, 2000; Paiva *et al*., 2003; Toassi and Abegg, 2005).

Diversos estudos da literatura vêm sendo realizados com a finalidade de verificar a associação entre cárie e fluorose dentária e o fator socioeconômico (Ellwood e O'Mullane, 1994; Gómez Soler *et al.*, 1999; Maltz e Silva, 2001; Brandão *et al.*, 2006; Meneghim *et al.*, 2007; Pereira *et al*., 2007; Cortlellazzi *et al*., 2008, 2009; Tagliaferro *et al*., 2008b; Noro *et al*., 2009; Parreiras *et al*., 2009).

Alguns relatos da literatura destacam que pessoas com piores condições sociais apresentam maior prevalência de cárie (Slade *et al*., 1996; Peres *et al*., 2000). Por sua vez, em relação à fluorose dentária, alguns autores afirmam que melhores condições socioeconômicas propiciam um aumento em sua prevalência (Ellwood e O'Mullane, 1994), enquanto que outros não encontraram relação entre esta situação (Gómez Soler *et al*., 1999; Maltz e Silva, 2001; Meneghim *et al.*, 2007; Parreiras *et al.,* 2009).

Assim, torna-se de grande importância que estudos epidemiológicos da cárie e fluorose dentária sejam realizados periodicamente, com o intuito de fornecer informações aos serviços públicos de saúde, e de avaliar a influência dos fatores socioeconômicos e comportamentais nestas alterações, para o planejamento e monitoramento das ações em saúde.

Dentro deste contexto, estudos vêm sendo conduzidos em Piracicaba e em Iracemápolis, respectivamente, com intuito de monitorar a prevalência e severidade da cárie e fluorose dentária (Pereira *et al.*, 2000; Meneghim *et al.*, 2006). Em Piracicaba, o primeiro estudo com o intuito de avaliar a cárie dentária foi realizado em 1971 quando a água de abastecimento público ainda não era fluoretada e o último foi realizado em 2005, indicando uma redução de 84,65% na severidade da doença. Em relação à fluorose dentária, o primeiro estudo realizado foi em 1991 e o último em 2001, observando e um aumento de

54% na prevalência de fluorose. Em Iracemápolis o estudo pioneiro para a avaliação da cárie e fluorose dentária ocorreu somente em 1991, época em que a água de abastecimento público ainda não era fluoretada, mostrando uma redução da experiência de cárie de 82,1% e um aumento da prevalência de fluorose de 685% até 2004. Tais estudos vêm mostrando uma tendência geral de declínio de cárie e um aumento da prevalência de fluorose. Neste sentido, é essencial que estudos epidemiológicos periódicos sejam conduzidos a fim de verificar se tal tendência vem se confirmando ao longo dos anos e também servir de parâmetro para os gestores de saúde pública.

Desta forma, o objetivo deste estudo, composto por dois estudos, foi avaliar a experiência de cárie e a prevalência da fluorose dentária em escolares de 12 anos de idade, dos municípios de Piracicaba/SP e Iracemápolis/SP, 2007, comparando estes dados com os levantamentos epidemiológicos realizados anteriormente, em Piracicaba para a cárie dentária (1971-2005) e para a fluorose dentária (1991-2001) e em Iracemápolis para a cárie e fluorose dentária (1991-2004), como também verificar a relação entre estas alterações, o fator socioeconômico e, variáveis comportamentais relacionadas com a saúde bucal.

CAPÍTULO 1: Trends in dental caries and fluorosis prevalence in 12-year-old Brazilian schoolchildren from two different towns

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Abstract

Objectives: This study aimed to describe the prevalence of dental caries and dental fluorosis in 12-year-old schoolchildren from two different towns in São Paulo State, Brazil, in 2007: town A (water fluoridation since 1971) and town B (water fluoridation since 1997) and to compare current prevalence rates with those from previous surveys, in town A, for dental caries (1971-2005), and for dental fluorosis (1991-2001) and in town B for dental caries and dental fluorosis (1991-2004). **Methods:** The sample consisted of 724 schoolchildren from public and private schools (town A) and 197 schoolchildren from public schools (town B). A calibrated dentist performed the examination, under natural light, using CPI probes and mirrors. Dental caries was measured using DMFT and SiC indexes. Fluorosis was measured using T-F index. The variation of DMFT and fluorosis prevalence over time were assessed by analysis of regression at 1% significance level, and by Chi-square test, at 5% significance level, respectively. **Results:** In 2007, the mean value of DMFT was 0.85 and 1.02, and the SiC index was 2.52 and 2.83 in towns A and B, respectively. Fluorosis prevalence was 29.4% (town A) and 25.4% (town B). In both towns, a significant caries reduction has been observed. Concerning fluorosis prevalence, an increase of 44.1% was noted in town A. Although, the increase was 1170% in town B. **Conclusions:** Results show continuous decrease in dental caries experience in both towns. Regarding fluorosis prevalence, stabilization trends were observed in town A. In town B, however, a constant increase was noted.

Key words: Dental caries, Dental fluorosis, Epidemiology

Introduction

Trends in caries experience have been reported throughout the world (1, 2, 3, 4). Caries decline has been also observed in Brazil according to the last national epidemiological survey conducted in 2002/2003 (5) and others studies carried out in some Brazilian regions (6, 7, 8, 9).

Although, a recent study indicates that there is a marked increase in the prevalence of dental caries in many countries and this increase signals a pending public health crisis (10). In addition, a series of clinical consequences have been observed over the last decades, such as the reduction in disease progression speed (11, 12), the concentration of lesions especially on the occlusal surfaces (13, 14), and the polarization phenomenon in which a minority of individuals presents the highest caries scores (15, 16). In order to measure caries experience in high-caries-level individuals, was proposed the Significant Caries Index (SiC) (17), where DMFT is calculated for upper-third of the entire sample that presents the highest caries levels.

On other hand, an increase of fluorosis prevalence has also been observed throughout the world (18, 19, 20, 21). The increase of dental fluorosis has also been reported in some studies carried out in Brazil (7, 22).

Some studies suggest that the association of fluoridated dentifrices and diet may increase the risk of fluorosis in young children living in fluoridated areas (23, 24).

Taking into account all these factors, it is essential that studies be carried out in order to monitor these tendencies and plan actions for public oral health. The aim of this research was to describe the prevalence of dental caries and dental fluorosis in 12-year-old schoolchildren from two different towns in São Paulo State, Brazil, 2007: town A (water fluoridation since 1971) and town B (water fluoridation since 1997), and to compare the current prevalence rates with those from previous surveys, developed in town A (1971-2005), for dental caries and for dental fluorosis (1991-2001), and in town B, for dental caries and dental fluorosis (1991-2004).

Material and Methods

Ethical Aspects

This study was approved by the Research Ethics Committee of Piracicaba Dental School, State University of Campinas, protocol number 089/2006. An Informed Consent Form was sent to parents before beginning the survey.

Characteristics of the Towns

Both towns are located in São Paulo State, Brazil.

Town A has 358.108 inhabitants and has a Human Development Index (IDH) of 0.83 (25). Fluoride has been added to water supply since 1971 (0.7 ppmF), when the first epidemiological survey on dental caries was conducted.

Town B has 18.026 inhabitants and has a Human Development Index (IDH) of 0.82 (25), similar to town A. Fluoride has been added to water supply since 1997 (0.7 ppm F).

Population studied

In town A, in the present study, the sample size was calculated on the basis of caries experience reported in previous studies. Considering a sampling error of 0.2 DMFT, design error =2, mean of 1.32 DMFT, standard deviation (SD) of 1.92, non-reply rate (loss of sampling elements) of 20%, and confidence level of 95%, 850 schoolchildren aged 12 years were selected in 2007. Public and private schools were selected by cluster sampling methods from the official records provided by local department of Education. Thus, 18 public and 6 private schools were selected, totalizing 24 schools, and 12 year-old children were chosen at random in each school (n=850). The inclusion criteria were those children whose parents had given consent for participation, who were present on the examination day, did not present severe dental hypoplasia or serious systemic disease, and did not use fixed orthodontic appliance. The final sample in 2007 was composed of 724 12-year-old schoolchildren of both genders, out of which, 613 were from public schools and 111 from private schools, achieving a response rate of 85%.

In town B, considering that exist only public schools, all 12-year-old schoolchildren, from the three public schools, were invited to participate in the epidemiological survey, totalizing 244 children selected in 2007. The inclusion criteria were those children whose parents had given consent for participation, who were present on the examination day, did not present severe dental hypoplasia or serious systemic disease,

and did not use fixed orthodontic appliance. The final sample in 2007 was composed of 197 12-year-old schoolchildren of both genders, achieving a response rate of 80.7%.

Diagnostic criteria and codes

Dental caries was registered examining all permanent teeth using the DMFT (mean number of decayed, missing and filled permanent teeth) index according to World Health Organization caries diagnostic criteria (26) and the SiC index that was determined for the one-third of the sample with the highest caries scores (17). Fluorosis prevalence (T-F≥1) was measured by the T-F index (27) and all buccal surfaces of all permanent teeth that showed more than two-thirds of erupted crown with the highest score of dental fluorosis being registered for each child. The differential diagnosis between very mild signs of dental fluorosis and nonfluorotic enamel opacities followed Russel's criteria (28).

Calibration

A benchmark dental examiner, skilled in epidemiological surveys, conducted the calibration process in 2007. Calibration processes with theoretical discussions about codes and criteria of dental caries and dental fluorosis, and practical activities with clinical examinations were performed by the examiners, and it lasted 28 hours. In the practical activities with clinical examinations and data analyzes, the mean Kappa was 0.89 for dental caries and 0.88 for dental fluorosis. Approximately 10% of the sample was re-examined in order to verify the intra-examiner reproducibility. Kappa values of 0.95 for dental caries and 0.89 Kappa for dental fluorosis were observed.

Examination Methodology

The results of the present study were compared to the results of previous surveys carried out in town A, (1971-2005) for dental caries (6, 8, 29-32), and (1991-2001) for dental fluorosis (6, 32) and in town B (1991-2004) for dental caries and dental fluorosis (6, 7, 32). All epidemiological surveys reported for both towns were conducted following the same protocol. Epidemiological exams in this study were carried out in 2007, and performed by one previously calibrated dentist in outdoor setting, under natural light, using CPI probes ("ball point") and dental mirrors #5, following the World Health Organization criteria (26). Prior to the examination, each child received a toothbrush with fluoridated

dentifrice and performed tooth brushing supervised by a dental hygienist. After the tooth brushing, teeth were dried with sterilized gauzes in order to obtain correct diagnosis.

Statistical procedures

The DMFT and SiC indexes, the proportion of caries-free children and the percentage of children with dental fluorosis were calculated. The variation of DMFT index over time was assessed by analysis of regression, and fluorosis prevalence (T-F≥1) was compared over time by the Chi-square test at 5% significance level.

Results

In 2007, the mean value of DMFT and SiC index were 0.85 (SD=1.54) and 2.52 (SD = 1.72) in town A and 1.02 (SD=1.61) and 2.83 (SD=1.60) in town B. The results show that 65.61% and 59.39% of children were caries-free for town A and town B, respectively.

Table 1 summarizes the results of dental caries experience obtained in all surveys in town A, carried out between 1971 and 2007 and showed a reduction of 90.12% in the DMFT index, out of which 57.5% was in the last 11 years, in the 1996-2007 period.

Table 2 presents dental caries experience obtained in six surveys realized in town B, carried out between 1991 and 2007 and showed a reduction of 85.1% in the DMFT index. After ten years of fluoridation of the water supply (1997-2007), the reduction of caries experience was 65.5% lower, while in the 1991-1997 period, with no fluoride in drinking water, the percentage of caries reduction was 56.7%.

According to Table 3, a difference between the DMFT indexes in both towns has been decreasing throughout the years, when compared to data collected in1995, 2001 and 2007. In 2001, for instance, the DMFT index was of 1.7 and 2.1 in towns A and B respectively, where a 0.4 difference between caries index in both towns was found. In 2007 this difference dropped to 0.15.

Table 4 shows the prevalence of fluorosis (T-F ≥ 1) in town A, recorded in 1991, 1995, 1997, 2001 and 2007. In 2007, 29.4% of the individuals presented fluorosis (T-F ≥ 1). A total of 70.6%, 13.95%, 14.78% and 0.67% of the children were scored as T-F=0, T-F=1, T-F=2 and T-F=3, respectively. According to the data collected in 1991, out of the

211 children examined, 20.4% presented fluorosis, result that remained nearly the same when data was collected in 1995, when 17.6% presented the same condition, not showing significant difference ($p<0.05$). In the period of 1997-2001, the increase was only 5.1%, not showing significant difference either ($p<0.05$). When comparing the data collected in 1991 and in 2007, a 44.1% increase of fluorosis prevalence was observed.

Table 5 shows the percentual of increase of fluorosis prevalence in town B between 1991 and 2007, that it was 1170%. In 2007, 25.4% of the sample presented fluorosis (T-F≥1). A total of 74.6% of the schoolchildren of town B were fluorosis free (T-F=0), 7.64%, 16.25% and 1.51% of the sample presented fluorosis T-F=1, T-F=2 and T-F=3, respectively.

According to table 5, in town B, in 1991 (year with no water fluoridation) only 2.0% presented fluorosis. In 1997 (year that the process of water fluoridation started), a 132% increase took place.

A significant decline of DMFT over a 36-year period of evaluation in 12-year-old schoolchildren town A could be demonstrated by analysis of regression with $R^2 = 0.9916$, ($p<0.01$), showing linear effect for DMFT and year of survey (Figure 1). Similar results can be seen in Figure 2, for DMFT index over a 16-year-period 12 year-old schoolchildren evaluated in town B demonstrated by analysis of regression with $R^2 = 0.9898$, showing linear effect for DMFT and year of survey.

Discussion

Results show constant decrease in caries prevalence in both towns over time (Figures 1 and 2). In 2007, 12-year-old schoolchildren from town A and town B presented an average of 0.85 and 1.0 DMFT, respectively (Table 1 and 2), which are lower than that presented by 12-year-old Brazilian individuals (2.78 DMFT) in the last National epidemiological survey carried out in 2002-2003 (5). Other studies conducted also in Brazil during the last decade show that DMFT for this group was 2.29 (low prevalence group), 3.36 (moderate prevalence group) and 5.54 in high prevalence group (33). In another town from São Paulo State, Brazil, the mean of DMFT was 1.53 in 2001 (34) and decrease to

0.90 in 2006 (9). The reduction in caries experience detected in both towns in the present study is an event also observed worldwide (2, 4, 34-36).

In 1991, certificated that in town B (town where the process of water fluoridation began only in 1997), the mean of DMFT finding in the schoolchildren examined was the double than the DMFT finding in town A (town where fluoridation is done in public water supply since 1971) verified in 1992. This difference in caries index observed at the time may be due to the fact that children in town A were always exposed to the benefit of fluorosis present in the water supply since the time of the eruption of their teeth.

Moreover, in town A, taking into account caries prevalence in studies carried out in 1980, DMFT was found to be nearly three times higher than the one found in 1992, which lead us to infer that schoolchildren examined in this last year benefited from fluoridated water, other forms of caries control and prevention, which may have caused this reduction. Even though the experiment design of the present study did not supply data for the evaluation of the causes for this reduction, one can conclude that some factors took place chronologically at that time, interacting in such a way that promoted a decline in caries prevalence. Among these factors are the wide use of dentifrice fluoridated, which became available in Brazil in 1989 (37). This component has been considered the most important factor worldwide concerning caries prevalence (22, 38, 39). Another factor that may have influenced in this reduction is the expansion of preventive programs in schools, including oral health education, which, along with fluoridated water and toothpaste, have been recognized as the main factors for caries decline in Brazil (6, 16, 40).

It is also important to point out the decline in the difference between caries index in the two towns. With basis on table 3, it was noted that the difference has declined throughout the years, according the data collected in 1995, 2001 and 2007, that is, town B is approaching the levels in town A regarding caries prevalence. Despite town B started the fluoridation process in public water supply later on and is also a smaller town considering the number of inhabitants, it presents little difference when compared to town A as far as the reduction of caries prevalence is concerned. Even though the analysis of the present study does not show enough data to evaluate the causes of this reduction, one can infer that

the factor that may have contribute for this process is the improvement in dental health care offered to schoolchildren in town B.

As for the SiC index, 2.52 and 2.83 were found in town A and B in 2007, respectively. These values are over two times higher than the mean DMFT for the entire sample in both towns. These findings are in line with some studies reported, demonstrating that caries experience in those individuals more affected by the disease is not only higher (41, 42) but also over two times higher (4, 8, 43).

Although the SiC Index in towns A and B is still high, it has already achieved Bratthall's proposal (2000) of a SiC Index lower than 3.0 for the year 2015 (17). Similar situation could be verified in another town in São Paulo State whose SiC Index was 2.63 in 2006 (9). The polarization phenomenon has been observed simultaneously with the decrease of caries prevalence (16).

Regarding dental fluorosis, reports in scientific literature have demonstrated an increase in prevalence rates (18-22), which could be confirmed in this research in town B, when comparing data from 2007 with those from data collected from 1991 to 2004 (Table 5).

In town A (Table 4), one may observe that despite dental fluorosis prevalence increase by 44.1% in 16 years of study (1991-2007), results show that for 10 years (1997 to 2007) this index remained nearly the same, presenting a tendency to stabilize, and showed a small reduction of 6.4% between the years of 2001 and 2007, without statistical difference ($p<0.05$). This tendency of stabilization was also reported in studies carried out in another town, Brazil (44).

Considering the increase of fluorosis prevalence, comparing both towns, from 1997 (year that began the process of water fluoridation in town B) to 2007, observed that town A presented an increase of only 5.1%, whereas in town B, the increase was 149%. One can suggest that others researches could be carried out to monitor fluorosis prevalence in town B.

A study conducted with Senegalese children living in a high-fluoride area, using the Dean Index for detected dental fluorosis, a fluorosis prevalence of 39.33% was observed (45), which is higher than the one found in both towns analyzed in this study. Nevertheless,

other studies reported lower prevalence, as well as the study carried out with 12-year-old schoolchildren in Curitiba, Paraná State, Brazil (46) where a prevalence of 23% was observed. Another research realized with Flemish schoolchildren related that 10% of the sample examined presented fluorosis (47) and in a survey carried out with also 12-year-old Brazilian schoolchildren observed a fluorosis prevalence of 18.2% (48).

In 2007, 70.6% and 74.62% of the schoolchildren were fluorosis free (T-F=0) in town A and B, respectively. Another study realized in Spain with schoolchildren between 7 and 12 years old, related similar findings (78.5% of the schoolchildren present T-F=0) (49).

In relation to fluorosis severity, the component T-F=1 (7.3%) observed in a study conducted with Flemish individuals (47), was lower than town A, but similar to town B, 2007. The component T-F=2 in town B in 2007, was higher than the one described in a town of Rio Grande do Sul State, Brazil, which was 5.8% (50) and higher than the ones observed in communities of British Columbia (1.4%) (51). In the present study the lowest score for both towns was the component T-F=3, and the highest was the T-F=2. However, in a research carried out in Germany, the T-F 3 was the highest score verified (52) suggesting higher severity of fluorosis than in both tows of the present study.

According to the epidemiological surveys discussed in this study, a continuous decline of dental caries experience could be verified after 36 years of water supply fluoridation in town A, from 1971 to 2007, and in town B from 1991 to 2007. Regarding dental fluorosis, stabilization trends were observed in town A. However, in town B, a constant increase was noted. It is possible, though, that dentifrice and water fluoridation are directly related with the increase in the prevalence of dental fluorosis. Future epidemiological surveys should be carried out in order to evaluate and monitor dental caries and fluorosis trends over time.

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Table 1: Mean DMFT and reduction (%) of caries experience for 12-year-old schoolchildren in town A, Brazil, according to year of survey.

Year of survey	Sample	Mean DMFT	% Reduction in consecutive surveys	% Reduction in relation to 1971
1971	204	8.60	-	-
1977	188	7.41	13.84	13.84
1980	144	6.17	16.73	28.25
1992	123	3.47	43.76	59.65
1995	142	2.70	22.19	68.60
1996	189	2.00	25.92	76.74
2001	824	1.70	15.00	80.23
2005	939	1.32	22.35	84.65
2007	724	0.85	35.60	90.12

57.5

Polynomial Regression ($p<0.01$) of mean of DMFT according to year of survey

Table 2: Mean DMFT reduction (%) of caries experience for 12-year-old schoolchildren in town B, Brazil, according to year of survey.

Year of survey	Sample	Mean DMFT	% Reduction in consecutive surveys	% Reduction in relation to 1991
1991	200	6.7	-	-
1995	160	3.9	41.8	41.8
1997	314	2.9	25.7	56.7
2001	244	2.1	27.6	68.7
2004	236	1.2	42.9	82.1
2007	197	1.0	16.6	85.1

65.5

Polynomial Regression ($p<0.01$) of mean of DMFT according to year of survey

Table 3: Difference among DMFT index of both towns.

Year of survey	DMFT town B	DMFT town A	Difference among DMFT index of both towns
1995	3.9	2.7	1.2
2001	2.1	1.7	0.4
2007	1	0.85	0.15

Table 4: Percentage of individuals with TF ≥ 1 and variation (%) of fluorosis prevalence for 12-year-old schoolchildren in town A, Brazil, according to year of survey.

Year of survey	Sample	Fluorosis prevalence (% T-F ≥ 1)		% Increase in consecutive surveys	% of Variation in relation to 1991
1991	211	20.4 b		-	-
1995	142	17.6 b		- 13.7	- 13.7
1997	190	3 1.0 a		76.1	52.0
2001	824	31.4 a	5.1	1.3	54.0
2007	724	29.4 a		- 6.4	44.1

Chi-square test – Numbers followed by different letters which differ at 5% significance level ($p<0.05$).

Table 5: Percentage of individuals with TF ≥ 1 and increase (%) of fluorosis prevalence for 12-year-old schoolchildren in town B, Brazil, according to year of survey.

Year of survey	Sample	Fluorosis prevalence (% T-F ≥ 1)	% Increase in consecutive surveys	% Increase in relation to 1991
1991	200	2.0 c	-	-
1995	160	4.4 c	120	120
1997	314	10.2 b	132	410
2001	244	12.7 b	25	535
2004	236	15.7 b	24	685
2007	197	25.4 a	62	1170

149

Chi-square test – Numbers followed by different letters which differ at 5% significance level ($p<0.05$).

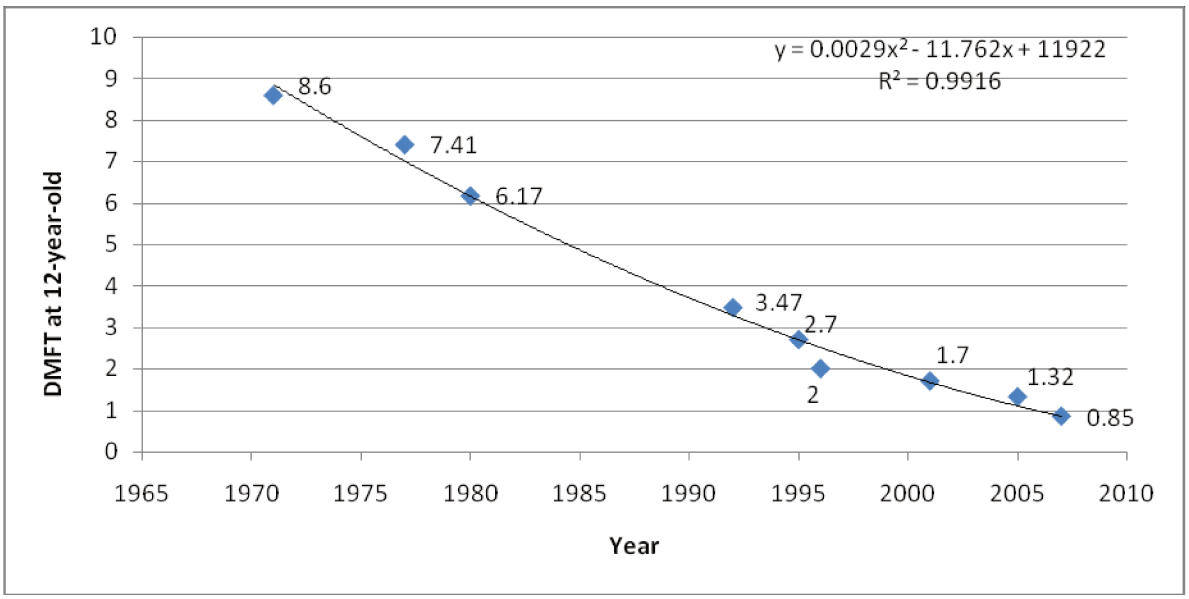

Figure 1: DMFT variation for 12 year-old schoolchildren in function of time in town A, Brazil ($p<0.01$).

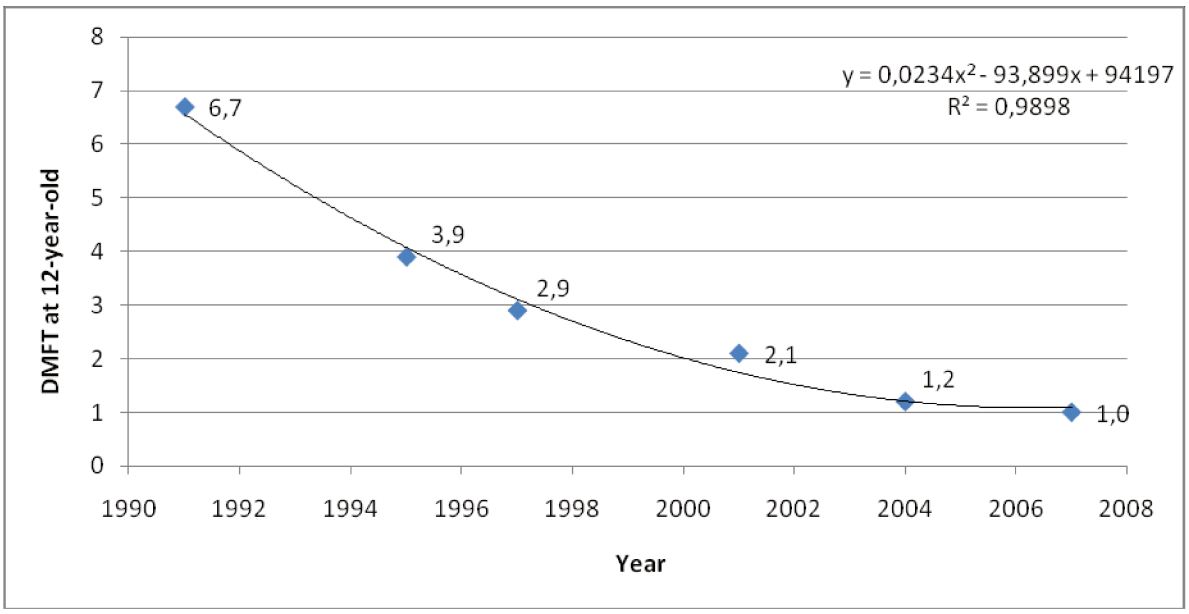

Figure 2: DMFT variation for 12 year-old schoolchildren in function of time in town B, Brazil ($p<0.01$).

CAPÍTULO 2: Relationship between dental caries, fluorosis prevalence, and Socioeconomic and Behavioral Variables among 12-year-old Schoolchildren

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Abstract

Objectives: This study aimed to evaluate caries experience and fluorosis prevalence in 12-year-old schoolchildren in Piracicaba, Brazil, in 2007, and to verify the relationship between these trends, socioeconomic and behavioral variables. **Methods:** The sample consisted of 724 schoolchildren from public and private schools. A calibrated dentist performed the examination, under natural light, using dental mirror and CPI probes. Dental caries was measured using DMFT and SiC indexes. Fluorosis prevalence was measured by using the T-F index. The socioeconomic and behavioral variables were collected by means of a parental semi-structured questionnaire. Then multiple logistic regression analyses using the stepwise procedure were performed in order to verify the relationship among the dependent variables (DMFT and fluorosis) and the independent variables (socioeconomic and behavioral variables). **Results:** The mean of DMFT and SiC index were 0.85 (SD= 1.54) and 2.52 (SD = 1.72), respectively, and 65.61% was caries free. Fluorosis prevalence was 29.42%, mainly T-F 2 (14.78%). By means of multiple logistic regression model, children, whose family earned up to four minimum wages, were 2.58 more prone to have caries (DMFT>0) than those whose family earned over four minimum wages. Besides, those children who visited the dentist were 4.27 more prone of being diagnosed with dental caries and receive treatment in comparison to those who never had visited the dentist. However, for fluorosis prevalence the multiple logistic regression model was not significant. **Conclusions:** The 12-year-old schoolchildren from Piracicaba presented very low prevalence caries. Significant associations between the presence of dental caries and monthly family income, as well as between dental caries and visiting to the dentist, were observed. Considering dental fluorosis, the majority of the sample did not present clinical signs of fluorosis evidences.

Key words: Dental caries, Fluorosis prevalence, Epidemiology

Introduction

Caries prevalence decrease is a phenomenon observed worldwide (Chawla *et al.*, 2000; Bonecker and Cleaton-Jones 2003; Pieper and Shutle, 2004). The last epidemiological survey in Brazil, carried out in 2002-2003 showed that DMFT in 12-year-old schoolchildren was 2.78 (Brazil, 2004). According to several published studies, caries reduction has been observed in both fluoridated and non-fluoridated areas, mainly in schoolchildren in south and southeastern Brazilian regions (Bastos *et al.*, 2005; Meneghim *et al.*, 2006; Pereira *et al.*, 2007; Tagliaferro *et al.*, 2008a).

Several studies reported that the main contributors for the decline of caries prevalence includes the widespread use of fluoride, especially water fluoridation and dentifrices, the reduction of sugar frequency consumption and the application of preventive and educative actions for the dental health care (Pereira *et al*., 2001; Cury *et al*., 2004). Nonetheless, dental caries is still considered a public health problem in Brazil (Brazil, 2004) and it is still the predominant cause of tooth loss around the world (Aoba and Fejerskov, 2002). However, Bagramian *et al.* (2009) reported a marked increase in the prevalence of dental caries in many countries, which signals a pending public health crisis. Moreover, caries polarization has also been observed around the world in which a minority of individuals presents the highest caries scores (Burt, 1998; Tickle, 2002; Narvai *et al.*, 2006). In order to measure caries experience in high-caries-level individuals Bratthall (2000) has proposed the Significant Caries Index (SiC), where DMFT is calculated for upper-third of the entire sample that presents the highest caries levels.

On other hand, an increase of fluorosis prevalence has also been reported in various locations worldwide (Pereira *et al.*, 2000; Cangussu *et al.*, 2002; Browne *et al.*, 2005; Cunha e Tomita, 2006; Meneghim *et al.*, 2006; Kukleva *et al.*, 2009). According to some studies, the use of drinking water containing fluoride, fluoridated toothpaste, fluoride supplements and specific foods or drinks have been identified as possible risk factors for the development of fluorosis (Lima & Cury, 2001; Toassi and Abegg, 2005).

Several studies have been conducted in order to verify the relationship among dental caries and fluorosis prevalence and socioeconomic factors (Brandão *et al.*, 2006; Meneghim *et al.*, 2007a; Pereira *et al.*, 2007; Cortlellazzi *et al.*, 2008, 2009; Noro *et al.*,

2009; Parreiras *et al.*, 2009) or behavioral variables related to oral health (Catani *et al.*, 2007; Pereira *et al.*, 2007; Tagliaferro *et al.*, 2008b)

In this context, it is very important to carry out epidemiological studies periodically in order to know and follow these tendencies over time, as well as to evaluate the influence of socioeconomic and behavioral variables on its epidemiology.

Therefore, the present study aimed to evaluate caries experience and fluorosis prevalence in 12-year-old schoolchildren in Piracicaba City, Brazil, 2007 and to verify the relationship between these trends, socioeconomic factors, and behavioral variables related to oral health.

Material and Methods

Ethical Aspects

This study was approved by the Research Ethics Committee of Piracicaba Dental School, State University of Campinas (UNICAMP), protocol number 089/2006. An informed consent form was sent to parents before beginning the survey.

Population studied

The sample size was calculated on the basis of caries experience reported in previous studies. Considering a sampling error of 0.2 DMFT, design error =2, mean of 1.32 DMFT, standard deviation (SD) of 1.92, non-reply rate (loss of sampling elements) of 20%, and confidence level of 95%, 850 schoolchildren aged 12 years were selected. Public and private schools were selected by the cluster sampling methods from the official records provided by the local department of Education. Thus, 18 public and 6 private schools were selected, totalizing 24 schools, and the 12 year-old children were chosen at random in each school (n=850). The inclusion criteria were those children whose parents had given consent for participation, who were present on the examination day, did not present severe dental hypoplasia or serious systemic disease, and did not use fixed orthodontic appliance. The final sample was composed of 724 12-year-old schoolchildren of both genders, out of which, 613 were from public schools and 111 from private schools.

Diagnostic criteria and codes

Dental caries was registered examining all permanent teeth using the DMFT (mean number of decayed, missing and filled permanent teeth) index according to World Health Organization caries diagnostic criteria (WHO, 1997) and the SiC index that was determined for the one-third of the sample with the highest caries scores (Bratthall, 2000). Fluorosis prevalence (T-F≥1) was measured by the T-F index (Thylstrup and Fejerskov, 1978) and all buccal surfaces of all permanent teeth that showed more than two-thirds of erupted crown with the highest score of dental fluorosis being registered for each child. The differential diagnosis between very mild signs of dental fluorosis and nonfluorotic enamel opacities followed Russel's criteria (Russel, 1961).

Calibration

A benchmark dental examiner, skilled in epidemiological surveys, conducted the calibration process. Calibration processes with theoretical discussions about codes and criteria of dental caries and dental fluorosis, and practical activities with clinical examinations were performed by the examiners, and it lasted 28 hours. In the practical activities with clinical examinations and data analyzes, the mean Kappa was 0.89 for dental caries and 0.88 for dental fluorosis. Approximately 10% of the sample was re-examined in order to verify the intra-examiner reproducibility. Kappa values of 0.95 for dental caries and 0.89 Kappa for dental fluorosis were observed.

Examination Methodology

Clinical examination was performed by one previously calibrated dentist in outdoor setting, under natural light, using CPI probes ("ball point") and dental mirrors #5, following the World Health Organization criteria (WHO, 1997). Prior to the examination, each child received a toothbrush with fluoridated dentifrice and performed tooth brushing supervised by a dental hygienist. After the tooth brushing, teeth were dried with sterilized gauzes in order to obtain correct diagnosis.

Non-clinical variables collection

All children received a semi-structured questionnaire to be answered by their parents based on Meneghim *et al.* (2007a). This questionnaire was aimed at collecting information on socioeconomic level (monthly family income, number of people living in the household, parents' educational level, home ownership), and behavioral variables

related to oral health (visits to the dentist, the last visit to the dentist, frequency of tooth brushing, the beginning of tooth brushing, using of dental floss), and questions related to the parents belief that after the oral treatment their son would not present dental caries anymore, and how the parents considered their son's oral health.

Statistical procedures

The DMFT and SiC indexes, the proportion of caries-free children and the percentage of children with dental fluorosis were calculated. The dependent variables (DMFT and fluorosis) were dichotomized in absent and present according to the median (med = 0). Univariate analyses using the Chi-square test ($\chi 2$) at 5% significance level were performed to test the influence of independent variables (socioeconomic characteristics and behavioral variables related to oral health) on dependent variables. Then multiple logistic regression analyses using the stepwise procedure were performed in order to verify the relationship among the dependent variables (DMFT and fluorosis) and the independent variables. Only the independent variables that showed significant association at $p < 0.15$ were selected for the regression analysis in order to eliminate variables that would make little contribution to the model. The independent variable "type of school" was not selected to be part of the regression model once it is highly connected to another independent variable, thus avoiding multicollinearity. The logistic regression models were adjusted estimating the Odds Ratios (OR), their 95% confidence intervals (CI), and significance levels. The analyses were performed using the software SAS (SAS Institute Inc. 8.2, 2001). at 5% significance level.

Results

The results of this study showed a mean of DMFT of 0.85 (SD= 1.54; Table 1) (n=724) for the 12-year-old schoolchildren. Among all the children selected for this study (n=850), a total of 724 schoolchildren, 404 girls (55.8%) and 320 boys (44.2%) were examined, achieving a response rate of 85%.

The most prevalent component of DMFT was filled (74%), followed by the decayed (24%) and the missing (2%) components. A total of 65.61% of the sample was caries free. The DMFT for the high caries-level individuals, or the polarization group was determined

considering a cut-off point of 1.00. The polarization group (n=241) presented a SiC Index of 2.52 (SD = 1.72) (Table 1).

Table 2 shows the association of independent variables with DMFT under the Chi-square test. Monthly family income ($p<0.0001$), father's education ($p=0.0296$), mother's education ($p<0.0001$), home ownership ($p=0.0770$), visits to dentist ($p=0.0048$), the reason of the last visit to the dentist ($p=0.0516$), use of dental floss ($p=0.1160$), if parents believed that after the oral treatment their son would not present dental caries anymore ($p=0.0218$), and how the parents considered their son's oral health ($p=0.0472$) were significantly associated with the DMFT at $p<0.15$, therefore selected to the multiple regression analysis.

Among these variables, monthly family income and visits to dentist remained in the multiple logistic regression model (Table 3). Children, whose family earned up to four minimum wages, were 2.58 more prone to have caries (DMFT>0) than those whose family earned over four minimum wages. Besides, those children who visited the dentist were 4.27 more prone of being diagnosed with dental caries and receive treatment in comparison to those who never had visited the dentist.

Considering dental fluorosis, the prevalence (T-F≥1) was 29.42%, mainly T-F score 2 (14.78%), followed by T-F score 1 (13.95%) and T-F score 3 (0.69%). Table 4 shows the association of independent variables with fluorosis under the Chi-square test. Monthly family income ($p=0.0656$), father's education ($p=0.1093$) and mother's education ($p=0.0366$) were significantly associated with the DMFT at $p<0.15$ and were selected to the multiple regression analysis. For fluorosis prevalence, the multiple logistic regression model was not significant.

Discussion

The 12-year-old schoolchildren from Piracicaba presented in 2007 an average of 0.85 DMFT (Table 1), which was lower than the presented by the 12-year-old Brazilian individuals (2.78 DMFT) in the last National epidemiological survey carried out in 2002-2003 (Brazil, 2004).

In 1997, Piracicaba presented a mean of DMFT of 2.2, which means that the town had already achieved the WHO global goals for the year 2000 for 12-year-old children

(DMFT≤3) (Federation Dentaire Internationale, 1982). Another study carried out in Piracicaba in 2005 shows a higher DMFT (1.32) (Pereira *et al.*, 2007) when compared to the present survey.

Recent international reported data have shown that the DMFT for 12-year-old children is also low ranging from 0.61 in Trinidad and Tobago (Naidu *et al.*, 2006), 0.80 in Dublin, Ireland, (Sagheri *et al.*, 2009), 1.1 in South Africa (van Wyk and van Wyk, 2004), 1.51 in the Canary Islands in Spain (Gómez-Santos *et al.*, 2008) to 3.7 in Lithuania (Milciuviené *et al.*, 2009). However, higher results were observed in a survey realized with schoolchildren non-indigenous living in the Amazon basin of Ecuador, showing a DMFT of 5.25 and only 2.60% of the sample were caries free (Medina *et al.*, 2008), and in a study conducted in Iran that showed that 47.7% of the 12-year-old children were caries-free (Pakshir, 2004).

Regarding the component of the DMFT index, 74% of all affected teeth were filled. National data had reported that the filled component to this group of children was 32.73% (Brazil, 2004), which suggests good coverage of oral health services available in Piracicaba.

The SiC Index is a good tool for measuring caries experience among those individuals more affected by the disease. Considering the high caries-level individuals examined in this study, the SiC Index was 2.52. This value is over two times higher than the mean of DMFT for the entire sample, which indicates that this group of 12-year-old-schoolchilddren need to receive specific oral health care. Although the SiC Index in Piracicaba is still high, it was similar to the value observed in Switzerland and Nepal, and lower compared to Germany in 2000 (3.30) (Pieper and Schulte, 2004), Greece in 2001 (4.23), France in 2006 (3.2), and Chile (4.3) in 2006-2007 (WHO, 2009). The polarization phenomenon has been verified around the world (Antunes *et al.*, 2004) and also in fluoridated and non-fluoridated Brazilian towns (Bastos *et al.*, 2005; Narvai *et al.*, 2006; Pereira *et al.*, 2007).

This study has also attempted to determine the association between caries experience among 12-year-old individuals and socioeconomic factors as well as behavioral variables related to oral health. According to the results, socioeconomic factors (monthly

family income) and variables related to oral health (visits to dentist) remained in the multiple logistic regression model and presented an association with dental caries (Table 3). In the present study, children with high family income were not as prone to have caries (DMFT>0), which is in line with studies previously reported (Campus *et al.*, 2001; Patussi *et al.*, 2001; Baldani *et al.*, 2004; Meneghim *et al.*, 2007a; Pereira *et al.*, 2007; Cortellazzi *et al.*, 2009).

A study carried out with Brazilian schoolchildren reported that equalitarian societies showed better levels of health than the inaqualitarians. Therefore, the more unequal income distribution in the society, the greater the contrasts related to health (Patussi *et al.*, 2001). In addition, according to Gillcrist *et al.* (2001), access to dental services also varies according to social class. Children from low-income families have less access to dental services than the ones with higher income. Consequently, they have less access to benefits coming from sealants and fluor topic application.

Another variable that remained in the multiple logistic regression model was "visits to dentist". Children who visited the dentist were 4.27 more prone of being diagnosed with dental caries and receive treatment in comparison to those who never had visited the dentist. In this case, it is believed that the flled component of the DMFT index may be the main factor interfering in the increase of caries index since this was the most prevalent factor in the present study (74%). However, in a study with adolescents in a Northeastern town in Brazil, this variable was not associated with dental caries (Peres *et al.*, 2000).

Considering dental fluorosis in the present study, the prevalence (T-F≥1) observed was higher than a study with German schoolchildren that showed a fluorosis prevalence of 10.1% (Momeni *et al.*, 2007) and higher comparing to another survey conducted with schoolchildren of the Canary Islands (Spain) showing that 21.5% of the children presented fluorosis (Gómez-Santos *et al.*, 2008). Nevertheless, Tan *et al.* (2005) verified higher fluorosis prevalence in schoolchildren in Malaysia using the Dean's index (58.7%).

Some researches in the scientific literature have demonstrated an increase of the prevalence of fluorosis (Cangussu *et al.*, 2002; Browne *et al.*, 2005; Cunha e Tomita, 2006; Meneghim *et al.*, 2006; Kukleva *et al.*, 2009). However, when comparing the data of the

present study to another one carried out in Piracicaba in 2001, which reported a fluorosis prevalence of 31.4%, a small reduction is noted (Kozlowski, 2001).

In relation to fluorosis severity, the most prevalent score observed in the present study was the T-F score 2 (14.8%). Although, in a survey conducted with also 12-year-old Brazilian children, the majority of the sample presented T-F score 1 (Meneghim *et al.*, 2007b). In another study in communities of British Columbia the T-F score 2 was 1.4% (Clark *et al.*, 2006). These findings suggest greater severity of fluorosis in the present study. Nevertheless, another survey realized with adolescents aged 13-15 years in Nairobi, Kenya, observed that 48.2% of the sample had severe degrees of dental fluorosis of T-F scores 5-9 (Makhanu *et al.*, 2009).

This study has also attempted to determine the association between dental fluorosis among 12-year-old individuals and socioeconomic factors as well as behavioral variables related to oral health. According to the results, in a univariate analysis, the only variable statistically associated was mother's education ($p=0.0366$). These results are in line with previous report data, which demonstrates that only the variable mother's education presents significant association with fluorosis ($p<0.01$) (Meneghim *et al.*, 2007a) and in line with another study carried out in Brazil, that also reported associations among dental fluorosis and parent's educational level (Toassi and Abegg, 2005).

However, for dental fluorosis the multiple logistic regression model was not significant. Similar results were found in another survey carried out in Minas Gerais State, Brazil, which described no relationship among dental fluorosis and socioeconomic variables (Parreiras *et al.*, 2009). Moreover, the results obtained in the present study indicate that a higher monthly family income does not infer in greater fluorosis increment, concurring to the findings of Gómez Soler *et al. (*1999) and Maltz and Silva (2001). Besides, there is no consensus in literature concerning the association between socioeconomic level and fluorosis (Cypriano *et al*., 2004; Maltz and Silva, 2001).

A study carried out with schoolchildren in São Paulo State showed different results, where the only variable that presented significant association with fluorosis was car ownership, which is a socioeconomic indicator. One indicator only does not reflect precisely the socioeconomic level of each individual (Catani *et al.*, 2007).

It can be assumed that the factor that may have contributed in the present study to the non-association between fluorosis and socioeconomic and behavioral variables in the regression model is the lack of information collected, such as the quantity of toothpaste used and the supervision of tooth brushing by an adult. Therefore, future studies are necessary in order to follow and compare such data contributing to the improvement of actions toward health.

Conclusions

In conclusion, caries prevalence in 12-year-old schoolchildren from Piracicaba was very low; significant associations between the presence of dental caries and monthly family income, as well as between dental caries and visiting to the dentist, were observed. Considering dental fluorosis, the majority of the sample did not present clinical signs of fluorosis evidences. Nevertheless, no tested variable was associated with the disturb.

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Table 1: DMFT and SiC Indexes for 12-year-old schoolchildren, Piracicaba, Brazil, 2007.

Index	Sample Size	Interval of Variation	Mean	Standard	Coefficient of variation (%)
DMFT	724	0 – 13	0.85	1.54	181.2
SiC	241	1 – 13	2.52	1.72	68.2

Table 2. Association between DMFT (dichotomization by absence and presence) and socioeconomic, behavioral variables related to oral health, and gender. Piracicaba, Brazil, 2007.

Variables	DMFT					
	0		>0			
	n	%	n	%	χ^2	*p*
Gender						
Female	259	64.11	145	35.89	0.9100	0.3401
Male	216	67.50	104	32.50		
Type of school						
Public	375	61.17	238	38.83	34.8250	<0.0001
Private	100	90.09	11	9.91		
Monthly family income						
≤ 4 Minimum Wages*	321	60.91	206	39.09	28.1895	<0.0001
> 4 Minimum Wages	130	83.87	25	16.13		
Number of people living in the household						
≤ 4 people	257	68.53	118	31.47	1.3426	0.2466
> 4 people	206	64.38	114	35.62		
Father's education						
≤ 8 years of schooling	222	63.07	130	36.93	4.7352	0.0296
> 8 years of schooling	192	71.38	77	28.62		
Mother's education						
≤ 8 years of schooling	229	59.95	153	40.05	15.9293	<0.0001
> 8 years of schooling	227	74.43	78	25.57		
Home ownership						
Yes	319	68.90	144	31.10	3.1269	0.0770
No	143	62.17	87	37.83		
Child's visits to dentist						
No	41	85.42	7	14.58	7.9427	0.0048
Yes	425	65.59	223	34.41		
Child's last visit to dentist						
0 (≤ 6 months)	180	65.22	96	34.78	0.0328	0.8563
1 (> 6 months)	232	65.91	120	34.09		
The reason of the last visit to dentist						
0 (check-up)	246	69.10	110	30.90	3.7881	0.0516
1 (some treatment or pain)	229	62.23	139	37.77		

Variables	DMFT					
	0		>0			
	n	%	n	%	χ^2	*p*
Frequency of child's tooth brushing						
0 (≤ 1 time)	41	65.08	22	34.92	0.0085	0.9264
1 (> 1time)	434	65.66	227	34.34		
The beginning of tooth brushing						
0 (≤ 1 year)	124	68.89	56	31.11	1.1430	0.2850
1 (> 1 year)	351	64.52	193	35.48		
Child use of dental floss						
Yes	206	71.03	84	28.97	4.3087	0.1160
No	243	64.29	135	35.71		
I don't know	12	57.14	9	42.86		
Do you believe that after the oral treatment your son will not present more dental caries						
Yes	135	62.79	80	37.21	7.6491	0.0218
No	203	73.29	74	26.71		
I don't Know	117	63.59	67	36.41		
How do you consider your son's oral health						
Excellent, very good, good	420	66.99	207	33.01	3.9379	0.0472
Very bad and bad	55	56.70	42	43.30		

* Minimum wage at the time of the data collection ≅ US$ 206.00

Table 3. Stepwise logistic regression with DMFT as dependent variable.

Variables	DMFT > 0		Odds ratio	Odds ratio (95% Confidence interval)	*p*-value
	n	%			
Monthly family income					
≤ 4 Minimum Wages*	206	39.83	2.58	1.53 – 4.37	0.0004
> 4 Minimum Wages	25	6.13	Ref		
Child visits to dentist					
No	7	14.58	Ref		
Yes	223	34.41	4.27	1.60 – 11.12	0.0027

* Minimum wage at the time of the data collection ≅ US$ 206.00

Table 4. Association between Fluorosis (dichotomization by absence and presence) and socioeconomic, behavioral variables related to oral health, and gender. Piracicaba, Brazil, 2007.

Variables	FLUOROSIS					
	0		>0			
	n	%	n	%	χ^2	*p*
Gender						
Female	291	72.03	113	27.97	0.9250	0.3362
Male	220	68.75	100	31.25		
Type of school						
Public	425	69.33	188	30.67	3.0036	0.0831
Private	86	77.48	25	22.52		
Monthly family income						
≤ 4 Minimum Wages*	368	69.83	159	30.17	3.3900	0.0656
> 4 Minimum Wages	120	77.42	35	22.58		
Father's education						
≤ 8 years of schooling	241	68.47	111	31.53	2.5642	0.1093
> 8 years of schooling	200	74.35	69	25.65		
Mother's education						
≤ 8 years of schooling	259	67.80	123	32.20	4.3694	0.0366
> 8 years of schooling	229	75.08	76	24.92		
Home ownership						
Yes	331	71.49	132	28.51	0.1657	0.6839
No	161	70.00	69	30.00		
Child visits to dentist						
No	32	66.67	16	33.33	0.4027	0.5257
Yes	460	70.99	188	29.01		
Frequency of the child's tooth brushing	47	74.60	16	25.40	0.5379	0.4633
0 (≤ 1 time)	464	70.20	197	29.80		
1 (> 1time)						
The beginning of tooth brushing						
0 (≤ 1 year)	130	72.22	50	27.78	0.3111	0.5770
1 (> 1 year)	381	70.04	163	29.96		

* Minimum wage at the time of the data collection ≅ US$ 206.00

CONSIDERAÇÕES GERAIS

Na última década, um declínio da prevalência de cárie dentária, principalmente na faixa etária de 12 anos, tem sido observado no mundo todo. Entretanto, uma pequena parcela da população ainda apresenta uma alta concentração da doença, a qual faz parte do denominado grupo de polarização. Por outro lado, ao mesmo tempo em que se observa a diminuição da experiência de cárie, verifica-se um aumento na prevalência de fluorose em várias localidades do mundo.

Diversos estudos vêm sendo realizados com a finalidade de verificar a associação entre cárie e fluorose dentária e o fator socioeconômico. Muitos observam que pessoas com piores condições sociais apresentam maior prevalência de cárie. Por sua vez, em relação à fluorose dentária, melhores condições socioeconômicas propiciam um aumento em sua prevalência.

Assim, torna-se de grande importância que estudos epidemiológicos da cárie e fluorose dentária sejam realizados periodicamente, com o intuito de fornecer informações aos serviços públicos de saúde, e de avaliar a influência dos fatores socioeconômicos e comportamentais nestas alterações, para o planejamento e monitoramento das ações em saúde.

Esta tese, composta por dois artigos, objetivou avaliar a experiência de cárie e a prevalência da fluorose dentária em escolares de 12 anos de idade, dos municípios de Piracicaba/SP e Iracemápolis/SP, 2007, comparando estes dados com os levantamentos epidemiológicos realizados anteriormente, em Piracicaba para a cárie dentária (1971-2005) e para a fluorose dentária (1991-2001) e em Iracemápolis para a cárie e fluorose dentária (1991-2004), como também verificar a relação entre estas alterações, o fator socioeconômico e, variáveis comportamentais relacionadas com a saúde bucal.

No capítulo 1, foi possível observar uma significativa redução da experiência de cárie em ambas as cidades. Com relação à prevalência da fluorose dentária, verificou-se um aumento de 44,1% em Piracicaba, observando uma menor prevalência entre alguns anos. Já em Iracemápolis, o aumento foi de 1170%.

No capítulo 2, ficou evidenciado que os escolares examinados apresentaram uma prevalência de cárie muito baixa. Além disso, as crianças pertencentes a uma família com

renda mensal inferior ou igual a quatro salários mínimos apresentaram 2,58 vezes mais chances de terem cárie (CPOD>0) do que aquelas pertencentes a uma família com renda mensal superior a quatro salários mínimos. Além disso, aquelas crianças que consultaram ao dentista apresentaram 4,27 vezes mais chances de serem diagnosticadas ou tratadas em relação à cárie do que aquelas que nunca foram ao dentista. Porém, em relação à fluorose, o modelo de regressão logística não foi significativo.

Portanto, os resultados desta tese permitiram concluir que tanto Piracicaba/SP quanto Iracemápolis/SP, apresentaram uma contínua redução da experiência de cárie em escolares de 12 anos de idade, no decorrer dos anos. Em relação à fluorose dentária, verificou-se uma tendência de estabilização em Piracicaba, porém em Iracemápolis, observou-se um aumento constante. Adicionalmente, observou-se uma associação entre a presença de cárie e renda familiar mensal, como também entre cárie e consultas ao dentista. Entretanto, em relação à fluorose dentária, nenhuma das variáveis testadas foi associada com esta alteração.

CONCLUSÃO

Os resultados dos estudos desta tese permitiram concluir que tanto Piracicaba/SP quanto Iracemápolis/SP, apresentaram uma contínua redução da experiência de cárie em escolares de 12 anos de idade, no decorrer dos anos. Em relação à fluorose dentária, verificou-se uma tendência de estabilização em Piracicaba, porém em Iracemápolis, observou-se um aumento constante. Adicionalmente, observou-se uma associação entre a presença de cárie e renda familiar mensal, como também entre cárie e consultas ao dentista. Entretanto, em relação à fluorose dentária, nenhuma das variáveis testadas foi associada com esta alteração.

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*De acordo com a norma da UNICAMP/FOP, baseada na norma do *International Committee of Medical Journal Editors* – Grupo de Vancouver. Abreviatura dos periódicos em conformidade com o Medline.

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ANEXO 1: Informação da Comissão Central de Pós-Graduação

INFORMAÇÃO CCPG/001/98

Tendo em vista a possibilidade, segundo parecer PG nº 1985/96, das teses de mestrado e doutorado terem um formato alternativo àquele já bem estabelecido, a CCPG resolve:

Artigo 1º - Todas as teses de mestrado e de doutorado da UNICAMP terão, a partir de Janeiro de 1999, o seguinte formato padrão:

I. Capa com formato único, dando visibilidade ao nível (mestrado ou doutorado), e à Universidade.

II. Primeira folha interna dando visibilidade ao nível (mestrado ou doutorado), à Universidade, à Unidade em que foi defendida e à banca examinadora, ressaltando o nome do orientador e co-orientadores. No seu verso deve constar a ficha catalográfica.

III. Segunda folha interna onde conste o resumo em português e o Abstract em inglês.

IV. Introdução Geral.

V. Capítulos.

VI. Conclusão Geral.

VII. Referências Bibliográficas.

VIII. Apêndices (se necessários).

Artigo 2º - A critério do orientador, os Capítulos e os Apêndices poderão conter cópias de artigos de autoria ou de co-autoria do candidato, já publicados ou submetidos para publicação em revistas científicas ou anais de congressos sujeitos a arbitragem, escritos no idioma exigido pelo veículo de divulgação.

Artigo 3º - A PRPG providenciará o projeto gráfico das capas bem como a impressão de um número de exemplares, definido e pagos pelo candidato, da versão final da tese a ser homologada.

Artigo 4º - Fica revogada a resolução CCPG 17/97.

Campinas, 11 de novembro de 1998

Prof.Dr. José Cláudio Geromel

Presidente

Comissão Central de Pós-Graduação

ANEXO 2: Comprovante de recebimento do artigo pela revista Community Dentistry and Oral Epidemiology

Community Dentistry and Oral Epidemiology - Manuscript ID CDOE-10-011

De: **onbehalfof+alison.mclean+adelaide.edu.au@manuscriptcentral.com** em nome de **alison.mclean@adelaide.edu.au**

Enviada: terça-feira, 12 de janeiro de 2010 17:40:33

Para: alinetonello@hotmail.com

12-Jan-2010

Dear Dr. Tonello:

Your manuscript entitled "Trends in dental caries and fluorosis prevalence in 12-year-old Brazilian schoolchildren from two different towns." has been received by the editorial office of Community Dentistry and Oral Epidemiology. Review procedures will now be handled by the editor.

Your manuscript ID is CDOE-10-011.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at http://mc.manuscriptcentral.com/cdoe and edit your user information as appropriate.

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Thank you for submitting your manuscript to Community Dentistry and Oral Epidemiology.

Sincerely,
Community Dentistry and Oral Epidemiology Editorial Office

ANEXO 3: Certificado do Comitê de Ética em Pesquisa (CEP)

COMITÊ DE ÉTICA EM PESQUISA
FACULDADE DE ODONTOLOGIA DE PIRACICABA
UNIVERSIDADE ESTADUAL DE CAMPINAS

CERTIFICADO

O Comitê de Ética em Pesquisa da FOP-UNICAMP certifica que o projeto de pesquisa "**Análise da distribuição da prevalência da cárie e fluorose dentária em função de variáveis sócio-econômicas**", protocolo nº **089/2006**, dos pesquisadores **ALINE SAMPIERI TONELLO e MARCELO DE CASTRO MENEGHIM**, satisfaz as exigências do Conselho Nacional de Saúde – Ministério da Saúde para as pesquisas em seres humanos e foi aprovado por este comitê em 31/07/2006.

The Research Ethics Committee of the School of Dentistry of Piracicaba - State University of Campinas, certify that project "**Analysis of distribution of dental caries and fluorosis prevalence related to socioeconomic variables**", register number **089/2006**, of **ALINE SAMPIERI TONELLO and MARCELO DE CASTRO MENEGHIM**, comply with the recommendations of the National Health Council – Ministry of Health of Brazil for researching in human subjects and was approved by this committee at 31/07/2006.

Profa. Cecília Gatti Guirado
Secretária
CEP/FOP/UNICAMP

Prof. Jacks Jorge Júnior
Coordenador
CEP/FOP/UNICAMP

Nota: O título do protocolo aparece como fornecido pelos pesquisadores, sem qualquer edição.
Notice: The title of the project appears as provided by the authors, without editing.

ANEXO 4: Termo de Consentimento Livre e Esclarecido (TCLE)

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Título da pesquisa: "Análise da distribuição da prevalência da cárie e fluorose dentária em função de variáveis sócio-econômicas".

Responsável pela pesquisa, pela apresentação do TCLE e pela obtenção do consentimento: Aline Sampieri Tonello (aluna do curso de Doutorado em Odontologia em Saúde Coletiva).

Por favor, leia cuidadosamente este termo de consentimento, pois nele contém todas as informações desta pesquisa e a função do participante voluntário. Caso tenha qualquer dúvida, você deverá esclarecê-la com o pesquisador responsável. Uma cópia deste termo de igual teor será entregue aos pais ou responsáveis dos participantes voluntários.

Justificativa: É evidente que a utilização do flúor, tanto na água de abastecimento como nos dentifrícios, acarretou a redução da prevalência de cárie em municípios beneficiados por estes métodos e, em especial, em crianças com melhores condições sócio-econômicas. Em contrapartida, há evidências da presença de fluorose em crianças com boas condições sócio-econômicas, que além de beberem água fluoretada, usufruíam o método de uso de flúor por meio dos dentifrícios e da dieta, fatos estes que originaram uma diminuição na prevalência da cárie e um aumento na prevalência da fluorose dentária. Assim, é importante monitorar tanto a distribuição da cárie em função do nível de inclusão social e o fenômeno denominado de polarização (uma baixa prevalência da cárie na maioria da população, e uma alta concentração da doença, numa pequena parcela da população), quanto a fluorose dentária em seus diferentes níveis de severidade e, também, em função de inclusão social (hipótese de maior acesso ao flúor). Por esses motivos, este trabalho torna-se necessário para determinar a prevalência de cárie e fluorose dentária, entre as diferentes classes sociais e períodos de tempo.

Objetivos: Determinar a prevalência de cárie e fluorose dentária em escolares de 12 anos de idade, tanto de escolas públicas, quanto particulares, de Iracemápolis/SP/Brasil e Piracicaba/SP/Brasil, no ano de 2007, e comparar com os resultados dos estudos anteriores; analisar se há diferença na prevalência da cárie e fluorose dentária, entre as diferentes classes sociais e verificar se essa diferença é acentuada em função da polarização da cárie.

Procedimentos utilizados: Participarão deste estudo, escolares de 12 anos de idade, cujos pais autorizarem a participação na pesquisa. Serão realizados exames bucais por meio visual, para diagnóstico da cárie e da fluorose dentária. Para a avaliação da cárie, será utilizado o índice de cárie dentária, CPO-D (OMS,1999) e para a fluorose dentária, será utilizado o índice T-F (THYLSTRUP & FEJERSKOV, 1978). Previamente aos exames bucais, será realizada uma escovação supervisionada com dentifrício fluoretado, permitindo

a remoção do biofilme dental. As crianças serão examinadas por um examinador auxiliado por um anotador, em cadeiras, no pátio das escolas, sob luz natural, utilizando para os respectivos exames, sonda tipo OMS, espelho clínico plano, espátulas de madeiras e gazes previamente esterilizadas, as quais serão utilizadas para secar os dentes e também para a remoção do biofilme, caso não tenha sido removido durante a escovação, permitindo realizar um correto diagnóstico. Para o diagnóstico da cárie, todos os dentes permanentes presentes serão examinados, enquanto que para a fluorose dentária, serão examinadas todas as superfícies vestibulares de todos os dentes permanentes, sendo excluídos do exame, aqueles com menos de 2/3 da coroa erupcionada ou que apresentarem restaurações. Os pais ou responsáveis, além do termo de consentimento livre e esclarecido (TCLE), irão responder um questionário sócio econômico baseado em GRACIANO (1980), com o intuito de classificar os escolares envolvidos na pesquisa em diferentes classes sociais, sendo inclusas também neste questionário, questões sobre dieta e hábitos de higiene bucal dos pais. As crianças também responderão, no momento da pesquisa, um questionário referente à sua dieta e seus hábitos de higiene bucal.

Grupo controle ou placebo: Não há grupo controle ou placebo neste estudo.

Desconfortos e riscos previsíveis: Estes exames não acarretarão riscos ou desconfortos previsíveis aos sujeitos da pesquisa, uma vez que serão submetidos apenas a exames clínicos no pátio da escola.

Benefícios esperados: Como benefício, os escolares receberão instruções sobre higiene bucal, sobre prevenção de cáries e doença periodontal, promovendo assim, uma melhora da sua saúde bucal. Se através dos exames for detectada alguma lesão de cárie, os participantes serão encaminhados (encaminhamento por escrito realizado pelo dentista examinador) para uma Unidade Básica de Saúde próxima à sua residência.

Informações: Os voluntários e seus pais/responsáveis serão informados acerca dos procedimentos, benefícios e aspectos pertinentes à pesquisa. A pesquisadora e seu orientador assumem o compromisso de proporcionar informação atualizada obtida durante a pesquisa, ainda que esta possa afetar a vontade do indivíduo em continuar participando.
Métodos alternativos para obtenção da informação desejada: Não há métodos alternativos para a obtenção das informações desejadas.
Retirada do consentimento: Os voluntários e seus pais/responsáveis têm a liberdade de retirar seu consentimento a qualquer momento e deixar de participar do estudo sem qualquer penalidade, prejuízo ao seu tratamento ou represálias de qualquer natureza.
Garantia de sigilo: Os dados da pesquisa têm finalidade exclusivamente científica, sendo assegurada total privacidade e sigilo. Os resultados deste projeto de pesquisa poderão ser apresentados em congressos ou publicados em revista científica, porém, a identidade do voluntário não será divulgada nessas apresentações.

Formas de ressarcimento e indenização: Não há previsão de ressarcimento de gastos, pois não há gastos previsíveis pela participação na pesquisa. Sendo esta pesquisa realizada somente por meios visuais, através do exame bucal, não há risco previsível

decorrente da mesma, consequentemente, não há previsão de indenização. Caso a criança apresente lesões de cárie, os responsáveis serão notificados e a criança será encaminhada para a Unidade Básica de Saúde próxima à residência da mesma. A orientação educacional para a prevenção da cárie dentária será fornecida a todos os participantes. Serão distribuídos Kits de Prevenção (escova de dente, fio dental e pasta de dente) durante a realização da pesquisa.

Aspecto legal: O projeto foi elaborado de acordo com as diretrizes e normas regulamentadas de pesquisas envolvendo seres humanos atendendo à resolução nº 196, de 10 de outubro de 1996, do conselho Nacional de Saúde do Ministério da Saúde - Brasília - DF.

Contatos: Se ainda houver qualquer dúvida, você poderá receber mais esclarecimentos conversando diretamente com a **pesquisadora responsável Aline Sampieri Tonello** ou com o **Prof. Dr. Marcelo de Castro Meneghim (orientador), pelo telefone:** (19) 2106-5209, ou na FOP-UNICAMP, **endereço:** Av. Limeira, 901, Piracicaba – SP, ou **via e-mail:** aline.tonello@neobiz.com. Você poderá também discutir seus direitos como participante da pesquisa com o Comitê de Ética da FOP/UNICAMP, **endereço:** Av. Limeira, 901, caixa postal 52, CEP: 13414-903, Piracicaba – SP, **via e-mail:** cep@fop.unicamp.br, via internet: http://www.fop.unicamp.br/cep/index.htm, ou **pelo telefone:** (19) 2106-5349.

CONSENTIMENTO DO PAI/RESPONSÁVEL

Li o Termo de Consentimento Livre e Esclarecido para a participação do me filho (a) em pesquisa clínica que foi explicado dentro de minha compreensão. Também tirei minhas dúvidas sobre este estudo com a pesquisadora, recebendo uma cópia de igual teor deste documento. Sei que ao assinar este Termo de Consentimento Livre e Esclarecido, estarei autorizando meu filho (a) a participar desta pesquisa e também, autorizando a liberação dos dados obtidos aos pesquisadores, ao patrocinador e para publicação em revistas científicas e congresso desde que não haja divulgação de dados pessoais. Sei também que a participação do meu filho (a) é voluntária e que posso interrompê-la a qualquer momento sem penalidades e sem prejudicar ou influenciar os resultados do estudo. Recebi uma cópia deste termo de consentimento.

IMPORTANTE: Não assine este termo se não teve a oportunidade de solucionar suas dúvidas e nem recebido respostas satisfatórias a todas elas!

Pedimos permissão aos senhores para que sejam realizadas consultas de saúde bucal em seu filho (a), no intuito de se verificar a situação de saúde de seus dentes. Salientamos que os exames são bem simples e tomarão apenas alguns minutos da aula, após a permissão prévia pela professora.

Eu, _____, mãe/pai ou responsável de _____ , portador do RG n.º_____, permito que sejam realizados exames bucais em meu filho.

Assinatura: _____
Telefone: _____

ANEXO 5: Questionário socioeconômico

Prezados Pais

Gostaríamos de poder colaborar para a melhoria de sua saúde bucal e a de seus filhos. Entretanto, para isso ser possível, precisamos inicialmente saber quais os hábitos e conhecimentos em saúde bucal de vocês e de seus filhos.

Sabemos muito bem que o dia-a-dia de cada um é bem corrido. Nossa intenção não é criticar e julgar seus hábitos, pelo contrário, enfatizamos que nossa intenção é poder ajudar com dicas e orientações em saúde. Muitas vezes, pequenas modificações em nossas atitudes e em nossa rotina podem nos trazes grandes benefícios.

Desta forma, gostaríamos de contar com sua colaboração no preenchimento deste questionário. É necessário que você seja o mais sincero possível. Após o término da pesquisa, a pesquisadora irá entregar uma cartilha educativa a todos os participantes, elaborada a partir das informações obtidas. Agradecemos a gentileza em participar.

TÍTULO DA PESQUISA: Análise da prevalência da cárie e fluorose dentária em função de variáveis sócio-econômicas.

PESQUISADORES: Aline Sampieri Tonello e Marcelo de Castro Meneghim

Pais/responsáveis pelo (a) aluno (a):_____

Solicitamos **preencher com um "x" a letra correspondente em cada questão** do presente questionário, que muito nos auxiliará no desenvolvimento da mencionada pesquisa, antecipando-lhes que os dados coletados serão tratados de forma confidencial, não sendo identificados em hipótese alguma.

1) QUESTÕES SÓCIO-ECONÔMICAS DO (A) RESPONSÁVEL:

1.1. Situação econômica da família (renda familiar mensal)

A. ( ) Até R$ 700,00
B. ( ) De R$ 701,00 a R$ 1400,00
C. ( ) De R$ 1401,00 a R$ 2100,00
D. ( ) De R$ 2101,00 a R$ 3500,00
E. ( ) De R$ 3501,00 a R$ 5250,00
F. ( ) De R$ 5251,00 a R$ 7000,00
G. ( ) Acima de R$ 7000,00

1.2. Número de pessoas na família (residentes na mesma casa)

A. ( ) Até 2 pessoas
B. ( ) 3 pessoas
C. ( ) 4 pessoas
D. ( ) 5 pessoas
E. ( ) 6 pessoas
F. ( ) Acima de 6 pessoas

1.3. Grau de instrução dos pais ou responsáveis

	PAI	MÃE	
A.	( )	( )	Não alfabetizado
B.	( )	( )	Alfabetizado
C.	( )	( )	1ª a 4ª Série incompleta (Antigo Primário)
D.	( )	( )	1ª a 4ª Série completa (Antigo Primário)
E.	( )	( )	5ª a 8ª Série incompleta (Antigo Ginasial)

F. ( ) ( ) 5ª a 8ª Série completa (Antigo Ginasial)
G. ( ) ( ) 2º Grau incompleto (Antigo Colegial)
H. ( ) ( ) 2º Grau completo (Antigo Colegial)
I. ( ) ( ) Superior incompleto
J. ( ) ( ) Superior completo

1.4. Habitação (moradia)
A. ( ) Residência própria quitada
B. ( ) Residência própria com financiamento a pagar
D. ( ) Residência cedida em troca de trabalho
E. ( ) Residência alugada
F. ( ) Residência cedida por não ter onde morar

2) QUESTÕES RELATIVAS ÀS CRIANÇAS:

2.1. A criança já foi levada ao dentista alguma vez? ( ) sim ( ) não
2.1.1. Se sim, qual a última vez que a criança foi ao dentista? ( ) menos 06 meses ( ) 1 ano ( ) + de 1 ano
2.1.2. Quantas vezes a criança escova os dentes por dia? ( ) 1x ( ) 2x ( ) 3x ( ) 4x ou +

2.2. Quando a criança começou a escovar os dentes?
( ) quando surgiram os primeiros dentes ( ) antes de 1ano ( ) entre 1 e 2 anos ( ) 3 anos ou mais

2.3. A criança utiliza fio dental? ( ) sim( ) não ( ) não sei

2.4. Acredita que após o tratamento realizado pelo dentista seu filho não terá mais cárie?
( ) sim ( ) não ( ) não sei

2.5. Como você descreve a saúde bucal de seu filho?
( ) excelente ( ) muito boa ( ) boa ( ) ruim ( ) muito ruim

A pesquisadora agradece a participação e coloca-se à disposição para esclarecimentos através do telefone (19) 2106 5209 e/ou e-mail: aline.tonello@neobiz.com.br

ANEXO 6: Ficha clínica

FACULDADE DE ODONTOLOGIA DE PIRACICABA-UNICAMP
LEVANTAMENTO EPIDEMIOLÓGICO **FICHA _____**

NOME:_____SEXO: ___ IDADE:_____
ESCOLA:_____SÉRIE:_____
MUNICÍPIO:_____ DATA:_____

	18	17	16	55 15	54 14	53 13	52 12	51 11	61 21	62 22	63 23	64 24	65 25	26	27	28
C	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ C
F	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ F
C	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ C
F	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ F
	48	47	46	45 85	44 84	43 83	42 82	41 81	31 71	32 72	33 73	34 74	35 75	36	37	38

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CONDIÇÃO DENTAL

DENTE PERMANENTE	DENTE DECÍDUO
0 - HÍGIDO	A
1 - CARIADO	B
2 - RESTAURADO COM CÁRIE	C
3 - RESTAURADO SEM CÁRIE	D
4 - PERDIDO POR CÁRIE	E
5 - PERDIDO POR OUTRAS CAUSAS	-
6 - SELANTE	F
7 - APOIO DE PONTE OU COROA	G
8 - NÃO ERUPCIONADO	-
T - TRAUMA	T
9 - EXCLUÍDO	-

FLUOROSE - ÍNDICE T-F

TF 0 - ESMALTE NORMAL
TF 1 - FINAS LINHAS BRANCAS OPACAS
TF 2 - SURGEM ÁREAS NEBULOSAS
TF 3 - FUSÃO DAS LINHAS BRANCAS
TF 4 - SUPERFÍCIE OPACA
TF 5 - SUP. OPACA COM DEPRESSÕES < 2 MM DIÂMET.
TF 6 - DEP. SE FUNDEM FORMANDO FAIXAS
TF 7 - P. E.* - ÁREAS IRREGULARES
TF 8 - P. E.* - MAIS DA METADE
TF 9 - P. E.* - MANUT. HALO CERVICAL DE ESM. OPACO
(*P.E. - perda de esmalte)

Anexos

Anexo 6

Fluorose dentária

☐