STELA MÁRCIA PEREIRA

EPIDEMIOLOGIA DA CÁRIE DENTÁRIA EM ESCOLARES DE 12 ANOS EM PIRACICABA: estimativas e indicadores de risco

Dissertação apresentada à Faculdade de Odontologia de Piracicaba, da Universidade Estadual de Campinas, para a obtenção do Título de Mestre em Odontologia. Área de concentração em Cariologia.

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Orientador: Prof. Dr. Antonio Carlos Pereira
Co-orientadora: Prof. Dra. Gláucia M. B. Ambrosano

Banca Examinadora:
Prof. Dr. Marcelo de Castro Meneghim
Prof. Drª. Vanessa Pardi
Prof. Dr. Antonio Carlos Pereira

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PROF. DR. ANTONIO CARLOS PEREIRA

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Eu aprendi...

... que ser gentil é mais importante do que estar certo;

... que eu sempre posso fazer uma prece por alguém quando não tenho a força para ajudá-lo de alguma outra forma;

... que algumas vezes tudo o que precisamos é de uma mão para segurar e um coração para nos entender;

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... que são os pequenos acontecimentos diários que tornam a vida espetacular;

... que Deus não fez tudo num só dia; o que me faz pensar que eu possa?

... que ignorar os fatos não os altera;

... que o AMOR e não o TEMPO, é que cura todas as feridas;

... que a maneira mais fácil para eu crescer como pessoa é me cercar de gente mais inteligente do que eu;

... que cada pessoa que a gente conhece deve ser saudada com um sorriso;

... que as oportunidades nunca são perdidas; alguém vai aproveitar as que você perdeu.

... que quando o ancoradouro se torna amargo a felicidade vai aportar em outro lugar;

... que devemos sempre ter palavras doces e gentis pois amanhã talvez tenhamos que engoli-las;

... que não posso escolher como me sinto, mas posso escolher o que fazer a respeito;

... que todos querem viver no topo da montanha, mas toda felicidade e crescimento ocorre quando você está escalando-a;

... que quanto menos tempo tenho mais coisas consigo fazer.

William Shaskeapeare

SUMÁRIO

RESUMO

O presente estudo, composto por 3 artigos teve como objetivos: a) analisar as desigualdades na distribuição da cárie e os indicadores de risco associados a este fato; b) descrever a experiência de cárie em escolares de 12 anos e sua relação com variáveis socioeconômicas, comportamentais e de acesso aos serviços; c) verificar a representatividade de cada dente permanente no índice CPOD. A amostra probabilística foi composta por 824 escolares provenientes de escolas públicas e privadas de Piracicaba em 2001 e 939 escolares em 2005. Os exames foram realizados por dois examinadores previamente calibrados, no pátio das escolas, sob luz natural, com os escolares sentados nas cadeiras e com escovação supervisionada realizada por THD, utilizando-se sonda periodontal (CPI) e espelho bucal plano, seguindo as recomendações da OMS. Os índices CPOD, Índice de Cuidados (Care Index) e o índice SiC (Significant Caries Index –grupo polarizado) foram utilizados. Um questionário semi-estruturado foi enviado aos pais para a obtenção das informações socioeconômicas e comportamentais. a) O CPOD foi de 1,7 (dp = 2,07), o índice SiC foi de 4,15 (dp=1,65) e o índice de cuidados 57,0%, em 2001. b) Para o levantamento de 2005 o CPOD e o Índice SiC foram 1,32 (dp=1,96) e 3,52 (1,86), respectivamente, e o Índice de Cuidados foi de 75,0%. Variáveis socioeconômicas e comportamentais foram indicadores de risco para a cárie não apenas para toda a amostra como também para o grupo polarizado. c) A distribuição do índice CPOD (freqüências relativa e absoluta) foi calculada em função de cada dente permanente. A média e o desvio padrão foram calculados considerando todos os dentes (CPOD–real) e os dentes mais afetados (CPOD–parcial). Por meio de análise de regressão, os dados do levantamento de 2005 foram utilizados para estimar modelos de regressão, em função dos dentes mais afetados. Para a validação dos modelos foi utilizado o levantamento realizado em 2001. Por meio apenas do status dos primeiros molares foi possível estimar em 82% e 81,5% o CPOD-real em 2001 e 2005, respectivamente. Por meio das equações de regressão (utilizando os dentes mais afetados) foi possível estimar o CPOD em 98,2%. As superfícies oclusais foram as mais atacadas (60,4%), seguidas pelas superfícies vestibulares e depois pelas distais. Estes dados refletem que o status dos primeiros molares é determinante para a estimativa do índice CPOD, demonstrando a suscetibilidade destes dentes à cárie na idade de 12 anos.

Palavras-chave: Índice CPO, fator socioeconômico, comportamento, molar.

ABSTRACT

The present study was composed by 3 articles which aims were: a) to evaluate the inequalities of caries distribution in schoolchildren and the risk indicators related to them; b) to describe the caries experience of 12-year-old schoolchildren from public and private schools and to verify the relationship between the disease and socioeconomic, behavioral and oral health variables; c) to determine the representativeness of each permanent teeth in the DMFT. The sample was randomized and composed by 1763 individuals from public and private schools in Piracicaba - SP/Brazil, in 2005 (n=939) and in 2001 (n=824). The examinations were carried out by two calibrated dentists in outdoor settings, under natural light, using mirror and ball point probe. The examinations were executed after tooth-brushing and followed the recommendations of WHO. A semi-structured questionnaire was sent to the parents to collect information on socioeconomic level and behavior variables related to dental health. a) In 2001, the DMFT and SiC (Significant Caries Index – polarized group) were 1.7 (SD=2.07) and 4.15 (SD=1.65), and the Care Index was 57.0%. b) The DMFT and the SiC Index were 1.32 (SD=1.92) and 3.50 (SD=1.86), respectively, and the Care Index was 75.0% in 2005. The socioeconomic and the behavioral variables related to dental health were considered risk indicators for caries in permanent dentition not only for the entire sample, but also for the polarization group. c) The DMFT distribution (absolute and relative frequencies) was calculated in function of each permanent tooth. The mean and standard deviation were determined for all teeth (DMFT–real) as well as for the most affected teeth (DMFT–partial). Regression models were estimated in function of the most affected teeth using the data collected in 2005 and they were validated using the data collected in 2001. By the status of the first molars, the DMFT – partial could be estimated in 82% and 81.5% in 2001 and 2005, respectively. The regression equations estimated 98.2% of the DMFT-real. The occlusal surfaces were the most attacked (60.4%) followed by the buccal and distal surfaces. In conclusion, the status of first molars was determinant to the estimation of DMFT index, demonstrating their susceptibility to caries in 12 year-old individuals.

Key-words: DMF index, socioeconomic, behavior, molar.

INTRODUÇÃO GERAL

É fato constatado em todo o mundo a redução da prevalência de cárie dentária (Irigoyen & Sanchesz-Hinojosa, 2000; Pitts et al., 2002; Bonecker & Cleaton-Jones, 2003; Pieper & Schulte, 2004; Bastos et al., 2005), havendo um consenso em relação aos fatores responsáveis por este acontecimento e suas conseqüências. O amplo uso dos fluoretos, em especial o presente na água de abastecimento público e nos dentifrícios, a redução da freqüência do consumo de açúcar e a implementação de ações de cunho preventivo e educativo pelos serviços odontológicos têm sido apontados como principais responsáveis por essa redução (Bratthall, 1996; Krasse, 1996; Pereira et al., 2001; Cury et al., 2004).

O declínio da prevalência de cárie vem sendo acompanhado por mudanças ocorridas no padrão e na distribuição da doença (Burt, 1998; Pine et al., 2003), sendo observadas algumas conseqüências clínicas tais como, a concentração das lesões em alguns dentes e superfícies (Alvarez-Arenal et al., 1998; Burt, 1998; Batchelor & Sheiham, 2004), redução na velocidade de progressão da doença assim como em sua morfologia (Newbrun, 1992) e a formação de grupos de polarização, onde uma pequena parcela da população concentra a maior parte das necessidades de tratamento decorrentes da cárie (Vehkalahti et al., 1997; Powell, 1998; Tickle, 2002).

Os levantamentos epidemiológicos em saúde bucal são realizados freqüentemente, e utilizam amplamente o índice CPOD (média dos dentes cariados, perdidos e obturados) para a obtenção de dados relativos à cárie dentária, entretanto, somente por meio deste índice não é possível identificar os indivíduos com os mais altos níveis da doença. Sendo o índice CPOD uma média, os altos escores de cárie apresentados pelos indivíduos que concentram a maior parte das lesões de cárie são dissolvidos pela larga porção de indivíduos livres de cárie, ou seja, com CPOD=0 (Bratthall, 2000). Com base neste fato, foi proposto em 2000 o Índice SiC (Significant Caries Index), que tem por objetivo dar atenção à 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. Estudos recentes têm utilizado este índice concomitantemente com o índice CPOD, demonstrando que este grupo polarizado apresenta mais do que o dobro da experiência de cárie apresentada por toda a amostra (Nishi, 2002; Tayanin, 2002).

Em face deste novo contexto epidemiológico em que a cárie está inserida, torna-se importante não apenas a avaliação da experiência de cárie dentária na população, mas também a identificação dos indivíduos, dentes e superfícies mais atacadas por essa doença, bem como a identificação dos indicadores de risco relacionados a estes fatos, com o intuito de fornecer informações aos serviços públicos para o planejamento e monitoramento das ações em saúde.

PROPOSIÇÃO

O presente estudo foi realizado em formato alternativo conforme deliberação da Comissão Central de Pós-Graduação (CCPG) da Universidade Estadual de Campinas – UNICAMP n°001/98 e foi composto por 3 capítulos, cujos objetivos são:

CAPÍTULO 1: Analisar as desigualdades na distribuição da cárie dentária e os indicadores de risco relacionados a este fato;

CAPÍTULO 2: Descrever a experiência de cárie dentária em escolares de 12 anos de idade e sua relação com variáveis socioeconômicas, comportamentais e de acesso aos serviços;

CAPÍTULO 3: Verificar a representatividade de cada dente permanente no índice CPOD.

CAPÍTULO 1

"Socioeconomic, behavioral and dental health care variables related to high caries-level individuals"

Submetido ao periódico "Community Dental Health"

Pereira SM[1], Ambrosano GMB[2], Pardi V[3], Cortellazzi KL[1], Kozlowski FC[1], Meneghim MC[2], Pereira AC[2].

[1] Graduate student, Dental Science – Cariology, Piracicaba Dental School, University of Campinas–UNICAMP, Piracicaba, São Paulo, Brazil.

[2] Professor, Piracicaba Dental School, University of Campinas – UNICAMP, Piracicaba, São Paulo, Brazil.

[3] Professor, Community Health, Dentistry College, University of Sagrado Coração – USC, Bauru, São Paulo, Brazil.

Author responsible for correspondence and for reprints request:

Antonio Carlos Pereira

School of Dentistry of Piracicaba – State University of Campinas

Av. Limeira, 901, Piracicaba, SP, 13414-903, Brazil

Tel: +55 19 34125209 Fax: +55 19 34125218

e-mail: apereira@fop.unicamp.br

Key words: Significant Caries Index, dental caries, risk indicators, schoolchildren.

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Abstract

Objective The aim of this study was to evaluate the caries distribution in schoolchildren from public and private schools in Piracicaba-SP, Brazil and its relation with socioeconomic, behavioral and access to health care services variables. ***Methods*** The sample was composed of 824 schoolchildren aged 12 selected by the cluster sampling method, considering proportionally the schoolchildren registered in private and public schools. The Significant Caries Index (SiC) - mean DMFT for 1/3 of the sample with the highest scores of the disease. The following social indicators: family monthly income, number of residents in the household, educational level of parents, home ownership and householder's occupation as well as oral hygiene habits were obtained using a semi-structured questionnaire to classify the schoolchildren in different socioeconomic levels. The access to dental health care was analyzed using the Care Index. ***Results*** The mean DMFT for the entire sample was 1.7 (SD= 2.07) and the SiC Index was 4.15 (SD=1.65). Eighty percent of the disease was concentrated in 31.9% of the sample. In a univariate analysis, the variables mean family monthly income, fathers' and mothers' educational level and socioeconomic levels were statistically asssociated with DMFT. The Stepwise Logistic Regression Model for group polarized (SiC) showed that gender and socioeconomic level were significant to classify the individual on the Sic group. ***Conclusions*** The risk indicators in this study for an individual to belong to the higher caries prevalence group were to be female and to belong to the lower socioeconomic level.

Introduction

The caries prevalence decrease is a real fact worldwide (Bastos *et al*., 2005; Bonecker and Cleaton-Jones, 2003; Irigoyen and Sanchesz-Hinojosa, 2000; Pieper and Shulte, 2004). A consensus regarding the main contributors for this change 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 (Bratthall, 1996; Cury *et al.,* 2004; Krasse, 1996; Pereira *et al.,* 2001).

However, changes in the disease's pattern and distribution have accompanied the caries prevalence decrease (Burt, 1998; Pine *et al*., 2003) and some clinical consequences have been observed, such as the concentration of caries lesions on some surfaces and teeth (Alvarez-Arenal *et al*., 1998; Batchelor and Sheiham, 2004; Burt, 1998); the change on the disease progression speed (Newbrun, 1992) and the polarization phenomenon in which a small number of individuals concentrates the highest caries scores (Powell, 1998; Tickle, 2002; Vehkalahti *et al*., 1997).

The heterogeneous distribution of the disease can be observed even in countries with low caries prevalence. In these countries the mean DMFT is considered very low by the WHO (DMFT 12 year-old $\leq$ 1,1) (Pitts *et al*., 2002); however, there are still individuals with high caries levels (Bratthall, 2000). When using the DMFT index, it is impossible to identify the high-level individuals since the DMFT index is a mean and does not reflect the disease distribution. In addition, the highest scores are dissolved since most individuals are either caries-free or have low DMFT. Therefore, an inaccurate interpretation of the reality is verified giving the impression that the disease is controlled. Nevertheless, a lot of individuals have caries lesions and they compose the so-called "polarization group" (WHO

2005). Consequently, the data on caries experience among the individuals with the highest scores of the disease in each population is relevant.

The "Significant Caries Index" (SiC) was suggested in 2000 by Bratthall. It aims at giving attention to the individuals who concentrate most of the disease and formulate a new global goal of oral health, on which the distribution of disease frequency in the population has a significant value (Bratthall, 2000). Studies have been developed using this index and demonstrate high caries experience for the polarization group in comparison to the mean DMFT for the same population (Nishi *et al*., 2002; Tayanin *et al*., 2002). In addition, other studies relate social, economical and behavioral factors with caries experience (Antunes *et al*., 2002; Campus *et al*., 2001; Nicolau *et al*., 2005; Pine *et al*., 2003). The discussion about the factors related to the polarization phenomenon and the best strategies to deal with this situation is vast (Batchelor and Sheiham, 2002; Campus *et al*., 2003; Peres *et al*., 2000; Tickle, 2002)

Piracicaba is an important city in São Paulo State, Brazil and currently shows low caries prevalence. However, it is unknown the caries experience of those high-caries level individuals and the possible associations with different variables. For this reason, the present study aims at verifying the caries inequalities distribution in a random sample of 824 schoolchildren aged 12 from public and private schools in Piracicaba, SP, Brazil and its relation with socioeconomic, behavioral and access to health care services variables.

MATERIAL AND METHOD

The study was approved by the Research Ethics Comittee of the School of Dentistry of Piracicaba, State University of Campinas, protocol number 31/2000 and an Informed Consent Form was obtained prior to the survey.

The sample was calculated according to caries experience reported in previous studies carried out in Piracicaba. A sampling error of 7%, standard deviation of 1.9, mean of 1.8 and confidence interval of 95% were assumed. The schools were selected by the cluster sampling method from a list of schools provided by the Education Manager – in Piracicaba and surroundings, considering proportionally the schoolchildren registered in private and public schools.

The sample was composed of 824 12-year-old schoolchildren, 403 (48.9%) females and 421 males (51.1%). The exams were carried out in 2001 following the WHO criteria (WHO 1997). The main examiner was previously calibrated by a Gold Standard examiner who was skilled in dental caries surveys. Also, the intra-examiner concordance was higher than 0.91 (Kappa) during the study. The schoolchildren were examined by a dentist using a mirror and a ball point probe (CPI) under natural light in the school yard, toothbrushing was supervised by a dental hygienist prior the examination and previous air-drying.

The social indicators: mean family monthly income, number of residents in the household, parents' educational level, home ownership and householder's occupation were obtained using a semi-structured questionnaire. The schoolchildren were classified in different socioeconomic levels: "A" and "B" being considered a high level, "C" and "D", a mean level, and "E", a low socioeconomic level (Graciano, 1980; Kozlowski, 2001). The

mean family monthly income was calculated according to the Brazilian minimum wage in 2001 (approximately US$78.26). Oral hygiene habits and dental visits were also collected.

The accessibility to dental health care was determined using the Care Index (Filled Teeth/DMFT x 100%) for the entire sample (Pitts *et al*., 2002). The Significant Caries Index was calculated as a mean DMFT for the third part of the population that showed the highest caries scores (275 schoolchildren).

The dependent variable DMFT was dichotomized according to the median (Med=0) whereas the variable 'taking part of the polarization group' was dichotomized in *yes* or *no*. Univariate analyses were performed to test the influence of independent variables (socioeconomic characteristics and behavioral variables related to oral health) on dependent variables, using the Chi-square test (χ^2) at 5% significance level. After that, multiple logistic regression analyses using the stepwise procedure were performed in order to identify the risk indicators for DMFT and for the polarization group. Only the independent variables that showed significant association at $p<0.15$ (Lucas et al., 2005) were selected for the regression analysis in order to eliminate variables that would make little contribution to the model. The logistic regression models were adjusted estimating the Odds Ratios (OR), their 95% confidence intervals (CI), and significance levels. All statistical tests were performed using the SAS software (SAS Institute Inc. 8.2, 2001) at 5% significance level.

RESULTS

The mean number of decayed, missing and filled teeth (DMFT) was 1.7 (SD = 2.07) for the 12-year-old schoolchildren (n=824) and the SIC index (n=275) was 4.15 (SD= 1.65). The polarization group showed over two times more the frequency of caries experience in comparison to the entire sample (Table 1). The cut-off point for the 1/3 of the individuals with the highest DMFT scores was DMFT=2. The percentage of schoolchildren with DMFT $\geq$ 6 was 7.55%, and 45.5% of the examined schoolchildren were caries-free (DMFT=0). In addition, it was verified that 31.94% of the sample showed 80% of the disease.

The polarization group was composed by 58.2% (n=160) female and 41.8% (n=115) male. The entire sample was composed by 824 schoolchildren aged 12 years, 403 (48.9%) females and 421 males (51.1%). The proportion of females in the polarization group was significantly higher than males (χ^2 test, p=0.00002). However, the mean DMFT index for female in the polarization group (mean=4.16, SD=1.66) was not significantly different from that found for male (mean=4.14, SD=1.66) (Student t-test, p=0.9082). The gender (p=0.0015), onset of tooth brushing (p=0.016) and socioeconomic level (p<0.0001) variables influenced caries prevalence (Table 2).

The association between DMFT and mean family monthly income (p=0.0002), educational level of father (p=0.0004) and mother (p<0,0001) was statistically different (Table 3). These associations show that poor economic and educational conditions are directly related to high caries prevalence.

The Logistic Regression Analysis showed that 9.67% of individuals classified at the "A" socioeconomic level, 10.64% at "B" level, 22.62% at "C", 42.35% at "D" level, and 35.62% at "E" level belong to the polarization group (Table 4). There was no evidence that the frequency of tooth brushing and the onset of tooth brushing interfered with the classification of individuals in the polarization group.

Female individuals were 2.24 more likely to belong to "SIC" group than male individuals ($p<0.05$). The individuals of the "D" socioeconomic level were 7.75 more likely to belong to "SIC" group ($p<0.05$) than those of "A" level. However, individuals of "E" socioeconomic level were 6.67 more likely to belong to the polarization group ($p<0.05$) than those of "A" level (Table 4). The Care Index for the entire sample was 57%, and for the polarization group was 75%.

DISCUSSION

Monitoring of oral health in Piracicaba city has been performed by periodical surveys that have shown a decrease of 80,23% caries prevalence, in age 12, from 1971 (DMFT=8.6) to 2001 (DMFT=1.7), being that 50% of the decrease occurred in the last decade (Kozlowski, 2001; Moreira *et al*., 1983; Pereira *et al*., 1995). Despite of this significant improvement in oral health, some people still show high levels of caries lesions.

The DMFT index for the sample was 1.7, indicating a good level of oral health and reaching the WHO global goals for the year 2000. The percentage of schoolchildren with DMFT $\geq$ 6 was 7.55%, similar to the results found in Bauru, SP, Brazil (5.2%). Nevertheless, 85.31% of the schoolchildren with caries experience showed DMFT $\geq$ 2 in Bauru, SP, Brazil (Bastos *et al*., 2005).

Regarding Care index, 57% of teeth with caries experience were filled. This value is higher than the ones found in England (48%), in Wales (52%) and similar to London (57%) (Pitts *et al*., 2002). These data suggest reasonable dental service coverage in the city. Nevertheless, 41% of the DMFT index was composed by the DT component showing that almost half of the sample still presents the need for treatment.

The SIC index (DMFT mean to those individuals with higher caries experience) demonstrate that the caries experience for the polarization group was more than double of the entire sample, (DMFT = 1.7; SiC = 4.15). Therefore, the SiC index was higher than the proposed goal of Bratthall to year 2015, SiC Index < 3, (Bratthall, 2000). Similar situation could be verified in other countries. In a study carried out in Lao, the DMFT and SiC index were, respectively, 4.61 and 8.06 (Tayanin *et al*., 2002). In Germany, in 2000, the DMTF was 1.24, while the Sic index was 3.30 and the authors observed a considerable inequality of oral health among the federal states in that country (Pieper and Schulte, 2004). In a study carried out in Sweden Counties, the mean DMFT varied from 0,5 to 1,4 and the SiC index varied from 1,4 to 3,6 (Nishi *et al*, 2002).

The polarization phenomenon was clearly observed in Piracicaba since 80% of the disease was concentrated in 31.9% of the sample. This phenomenon has been observed simultaneously with the decrease of caries prevalence in recent surveys. The investigation of this phenomenon is essential for the revision of health politics once better planning of health actions can be applied and most of the problems related to social and economic indicators can be prevented by means of individualized early preventive care (Campus, *et al.,* 2003).

The settlement of polarization groups has been verified worldwide (Marthaler *et al*., 2005; Newbrun, 1992; Powell, 1998). In Helsinki, Finland, in 1993, 55% of all decayed teeth were concentrated in 10% of the examined individuals aged 5 to15 (Vehkalahti, 1997). In a study carried out in some districts of Wales, different conditions of oral health were verified in schoolchildren aged 11-12 and high treatment needs levels were found in small geographic areas (Ellwood and O' Mullane, 1996). In a research, carried out in the northwest of England, it was possible to ascertain that half of the disease was concentrated in a minor population (Tickle, 2002). In São Paulo, Brazil, a study carried out with schoolchildren aged 5 to12 showed a heterogeneous distribution of caries in different city areas and it was verified that high caries prevalence levels wers verified in social deprived areas (Antunes *et al.,* 2004).

The discussion about the factors that may have contributed to the concentration of the disease in a small portion of the population and the significant associations between caries and social, economic and behavioral indicators has been reported in the dental literature during the last decades. In the present study, using Logistic Regression Analysis, gender and socioeconomic level showed a significant role ($p<0.05$) in the classification of the individual to polarization group (SiC). A significant correlation between dental caries index and different social indicators as well as service access was verified in children aged 12 in Paraná State, Brazil (Baldani *et al.,* 2004). In a study performed out in Sassari, Sardínia, Italy, the results showed that socioeconomic and behavioral factors took part in the caries process (Campus *et al.,* 2001).

The social condition has also been associated with caries decline according to surveys carried out in 1983 and 1998 in Belgium. The authors verified a decrease in caries

prevalence in non-privileged as well as in privileged children, even though non-privileged children had shown significantly higher DMF scores than privileged children in both cohorts (Van Nieuwenhuysen *et al.*, 2002).

Considering that the caries diseases are complex and several social characteristics may influence its distribution in a population, a detailed analysis of data found in literature is necessary in order to identify the group most exposed to disease (Bratthall, 2000). The knowledge of the disease distribution and related factors can be considered strong contributors for the design of adequate social programs to promote oral health (Antunes *et al.,* 2004)

Good oral health levels for the entire sample (DMFT = 1,32) was observed in the present study, showing that the preventive programs carried out in this period have been effective in caries control. However, new measures should be targeted to the high caries level individuals since they concentrated most part of the disease. The risk indicators for an individual to belong to a higher caries prevalence group were to be female and belong to a poor socioeconomic level.

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TABLE 1. DMFT index for the total sample and for the "SiC" group.

Sample	n	DMFT			
		Variation Interval	Mean	Standard deviation	Coefficient of variation (%)
Total	824	0 – 14	1.70	2.70	158.80
SiC	275	2 – 14	4.15	0.50	12.05

TABLE 2. Univariate Analysis to associations between DMFT (dichotomized in median) and gender, behavioral and socioeconomical variables in the all sample.

	DMFT ≤ 1 (median)	DMFT > 1 (median)	P-level
Gender			
Female	158 (51.3)	150 (48.7%)	0.0015
Male	175 (64.33%)	97 (35.66%)	
Visits to dentist			
More frequently	187 (56.5%)	144 (43%)	0.6157
Less frequently	136 (58.6%)	96 (41.38%)	
Frequency of tooth brushing			
More frequently	75 (54.35%)	63 (45.65%)	
Less frequently	166 (56.27%)	129 (43.75%)	0.7074
Onset of tooth brushing			
≤ 1 year old	04 (64.6%)	57 (35.4%)	
> 1 year old	194 (53.3%)	170 (46.7%)	0.016
Socioeconomic level			
A	25 (80.65%)	6 (19.35%)	
B	38 (80.85%)	9 (19.15%)	<0.0001
C	57 (68.67%)	26 (31.33%)	
D	80 (47.62%)	88 (52.38%)	
E	130 (52.63%)	117 (47.37%)	

TABLE 3. Chi-square test (χ^2) p-values for the association between DMFT (dichotomized in median) and socioeconomic variables.

	DMFT ≤ 1 (median)	DMFT > 1 (median)	P-level
Family montly income			
up to 2 minimum wages*	72 (55.38%)	58 (44.62%)	
over 2 up to 4 minimum wages	89 (50.28%)	88 (49.72%)	0.0002
over 4 up to 8 minimum wages	52 (48.60%)	55 (51.40%)	
> 8 minimum wage	104 (71.72)	41 (28.28%)	
Number of residents			
≤ 4 people	179 (57.93)	130 (42.07)	0.7986
> 4 people	157 (56.88)	119 (43.12%)	
Education level of father			
Incomplete middle-school	124 (48.82%)	130 (51.18%)	
Incomplete high-school	58 (59.79%)	39 (40.21%)	0.0004
Complete high-school	45 (54.88%)	37 (45.12%)	
Incomplete university	26 (76.47%)	8 (23.53%)	
Complete university	37 (77.08%)	11 (22.92%)	
Education level of mother			
Incomplete middle-school	152 (50.50%)	149 (49.50%)	
Incomplete high-school	66 (53.66%)	57 (46.34%)	<0.0001
Complete high-school	55 (68.75%)	25 (31.25%)	
Incomplete university	17 (77.27%)	5 (22.73%)	
Complete university	41 (80.39%)	10 (19.61%)	
Home			
Yes	226 (56.64%)	173 (43.36%)	0.55693
No	110 (59.17%)	76 (40.86%)	

* Minimum wage at the time of the data collection, approximately US$ 78.26

TABLE 4. Stepwise logistic regression for SiC.

Log likelihood = -476.82 χ^2=46.67 p<0.0001

	Polarization group (Sic group)	Odds ratio	Odds ratio (95% Confidence interval)	*p* - level
Gender				
Male	121/309 (39.2%)	Reference	1.422 – 3.518	0.0005
Female	69/274 (25.2%)	2.237		
Socioeconomic level				
A	3/31 (9.67%)	Reference		
B	5/47 (10.64%)	0.853	0.126 – 5.747	0.8704
C	19/84 (22.62%)	3.676	0.750 – 17.857	0.1084
D	72/170 (42.35%)	7.751	1.661 – 35.714	0.0092
E	88/247 (35.62%)	6.666	1.431 – 31.250	0.0156

CAPÍTULO 2

"Dental Caries in 12-year-old Schoolchildren and its Relationship with Socioeconomic and Behavioral Variables"

Submetido ao periódico "Caries Research"

Pereira SM[a], Tagliaferro EPS[a], Ambrosano GMB[a], Cortellazzi KL[a], Meneghim MC[a], Pereira AC[a]

[a]Piracicaba Dental School, University of Campinas – UNICAMP, Piracicaba, São Paulo, Brazil.

Short title: Caries Risk Indicators in Schoolchildren

Key Words: dental caries; epidemiology; DMFT; Significant Caries Index; schoolchildren

Author responsible for correspondence and for reprints request:

Antonio Carlos Pereira

Faculdade de Odontologia de Piracicaba - UNICAMP

Av. Limeira, 901, Piracicaba, SP, 13414-903, Brazil

Tel: +55 19 34125209 Fax: +55 19 34125218

E-mail: apereira@fop.unicamp.br

Declaration of Interests

The authors declare that is no potential conflict of interests because none of the authors has a personal or financial relationship that might introducing bias or affect their judgment.

ABSTRACT

This study attempts to describe the caries experience of 12-year-old schoolchildren and to verify the relationship between the disease and demographic characteristics, socioeconomic factors as well as behavioral variables related to oral health. The random sample was consisted of 939 individuals from public and private schools in Piracicaba, São Paulo State, Brazil, in 2005. A calibrated dentist performed the examination in outdoor setting, under natural light, using CPI probes and mirrors, following the WHO recommendations. A questionnaire was sent to the parents to collect information on socioeconomic level and behavioral variables related to dental health. The DMFT, the Care Index and the SiC Index were determined. Multiple logistic regression analyses using the stepwise procedure were performed in order to identify the risk indicators for the DMFT and for the polarization group. The DMFT and the SiC Index were 1.32 (SD=1.92) and 3.52 (SD=1.86), respectively, and the Care Index was 75.0%. The regression models showed that females and children with both low family income or low education level of the fathers were prone to have caries or take part in the polarization group. The 12-year-old individuals from Piracicaba presented a low prevalence of caries. Nevertheless, those high caries-level individuals showed moderate caries experience. The socioeconomic and the behavioral variables related to dental health were risk indicators of caries in permanent dentition not only for the entire sample, but also for the polarization group.

INTRODUCTION

Dental caries is still the predominant cause of tooth loss around the world [Aoba and Fejerskov, 2002]. For this reason, it is important to monitor the disease overtime as well as to evaluate the influence of socioeconomic and behavioral variables on its epidemiology.

Data concerning dental health of 12-year-old individuals have been published elsewhere. Several studies have shown downward trends in caries experience throughout the world [Chawla et al., 2000; Irigoyen and Sanchez-Hinojosa, 2000; Bonecker and Cleaton-Jones, 2003; Marthaler, 2004; Pakshir, 2004; Pieper and Schulte, 2004; van Wyk and van Wyk, 2004], and in both fluoridated and non-fluoridated areas in Brazil [Pereira et al., 2000; Sales-Peres and Bastos, 2002; Bastos et al., 2004]. This indicates that dental caries in 12-year-olds is becoming a less prevalent disease. In Brazil, the expansion of preventive programs at schools, the water fluoridation and the fluoridated dentifrices, which have been available in Brazil since 1989, have been recognized as the main factors that have contributed for caries decline [Pereira et al., 2001; Cury et al., 2004].

Another phenomenon that has also been observed is the caries polarization in which a minority of individuals presents the highest caries scores [Burt, 1998; Powell, 1998; Tickle, 2002]. In order to measure the caries experience in the high caries-level individuals, Bratthall [2000] has proposed the Significant Caries Index (SiC), where the DMFT is calculated for the one-third of the entire sample that presents the highest caries levels.

Several surveys conducted in 12-year-olds during the last years have shown significant association between dental caries and socioeconomic [Campus et al., 2001; Baldani et al., 2004] or behavioral variables [Campus et al., 2001]. However, only few

studies have been carried out in order to clarify the factors associated with caries polarization. Antunes et al. [2004] have found that the SiC Index was strongly correlated with socioeconomic level, dental health and fluoridated water supply accessibility. However, there is no recent data collected in Brazil on caries polarization and its associated factors. Therefore, this study has attempted to describe the caries experience in 12-year-old schoolchildren in Piracicaba, Brazil and to verify the relationship between the disease and socioeconomic factors, and behavioral variables related to oral health. Piracicaba is located in São Paulo State, holds 329,158 inhabitants (IBGE – Brazilian Institute of Geography and Statistics, 2005), and has a Human Development Index of 0.81 [IBGE, 2004]. Fluoride is being added to water supply since 1971 when the first epidemiological survey on dental caries was conducted. Since then, caries decline has been verified [Pereira et al., 2001].

MATERIALS AND METHODS

Ethical aspects

The study was approved by the Research Ethics Committee of the Piracicaba Dental School, State University of Campinas, protocol number 148/2003 and an Informed Consent Form was obtained prior to the survey.

Sample

The sample size was calculated based on caries experience reported in previous studies carried out in Piracicaba-SP, Brazil. Considering a mean of 1.8 DMFT, standard deviation of 1.9, admitting a sampling error of 7%, and a confidence level of 95%, the sample size was defined in 939 individuals aged 12 years. Public and private schools were selected by the cluster sampling methods from the official records supplied by the Local

Department of Education. The twelve-year-old individuals were chosen at random in each school and only those who returned the informed consent form and also presented no systemic disease, participated in the present study.

Methods

Prior to the examination, the dentist participated in the calibration process, which was divided into theoretical discussions on codes and criteria for the study, and practical activities. The dentist examined all individuals in 2005 in outdoor setting, under natural light, previous air-drying; using CPI probes ("ball point") and mirrors, following the World Health Organization – WHO recommendations [WHO, 1997]. Each child received a toothbrush with fluoridated dentifrice and performed toothbrushing supervised by a dental hygienist prior the examination. Dental caries was registered using the DMFT index according to World Health Organization caries diagnostic criteria [WHO, 1997]. In the calibration process and during the examination, when 10% of the sample was reexamined, good intra-examiner reproducibility (Kappa>0.91) was reached.

Questionnaire

All children received a semi-structured questionnaire to be answered by their parents. This questionnaire aimed at collecting information on socioeconomic level (monthly family income, number of people living in the household, parents' educational level, home ownership, householder's occupation, car ownership), and behavioral variables related to oral health (onset of toothbrushing).

Statistical Analysis

The mean number of decayed, missing and filled permanent teeth (DMFT) and percentage of caries-free children (DMFT=0) were calculated for the entire sample. The

Care Index was calculated in order to measure the health service accessibility by the equation as it follows: [(FT/DMFT) x 100] [Pitts et al., 2002]. The Significant Caries Index (SiC) was determined for the one-third of the children with the highest caries scores [Bratthall, 2000].

The dependent variable DMFT was dichotomized according to the median (Med=0) whereas the variable 'taking part of the polarization group' was dichotomized in yes or no. Univariate analyses were performed to test the influence of independent variables (socioeconomic characteristics and behavioral variables related to oral health) on dependent variables, using the Chi-square test (χ^2) at 5% significance level. Then multiple logistic regression analyses using the stepwise procedure were performed in order to identify the risk indicators for DMFT and for the polarization group. Only the independent variables that showed significant association at $p<0.15$ [Lucas et al., 2005] were selected for the regression analysis in order to eliminate variables that would make little contribution to the model. The logistic regression models were adjusted estimating the Odds Ratios (OR), their 95% confidence intervals (CI), and significance levels. All statistical tests were performed using the SAS software [SAS Institute Inc. 8.2, 2001] at 5% significance level.

RESULTS

The results of this study showed a mean DMFT of 1.32 (SD = 1.92; Table 1) and a DMFS of 2.00 (SD = 3.27) for 12-year-old schoolchildren. The most prevalent component of DMFT was the FT (78.42%), followed by the DT (19.72%) and the MT (1.86%) components. The Care Index was 75.0% with a confidence interval ranging from 71.0% to 78.3%. A total of 52% of the individuals were caries-free. The girls (DMFT=1.52;

SD=2.14) showed statistically higher caries prevalence (p=0.0184; Table 2) than the boys (DMFT=1.03; SD=1.52).

The DMFT for the high caries-level individuals, or the polarization group, was determined considering a cut-off point of 2.00. The polarization group presented a SiC Index of 3.52 (Table 1). In addition, 89% of the disease was concentrated in 33.12% (or 1/3) of the sample. The Sic Index was 3.70 (SD=2.08) for the girls and 3.16 (SD=1.29) for the boys.

Table 2 shows the association of independent variables with DMFT under the Chi-square test. Gender, monthly family income, car ownership, number of people living in the household and parents' educational level variables were significantly associated with the DMFT at $p<0.15$. Fathers' educational level was the variable showing the highest association with caries experience in permanent dentition ($p<0.0001$). On the other hand, the variables home ownership and onset of toothbrushing were not significantly associated with DMFT. Gender, monthly family income and fathers' educational level were considered risk indicators for caries in permanent dentition as shown by the logistic model (Table 3).

Table *4* shows the association of independent variables with caries polarization under the Chi-square test. Gender, monthly family income and parents' educational level variables were significantly associated with the caries polarization at $p<0.15$. In the stepwise logistic regression, gender, monthly family income, and fathers' educational level variables were risk indicators for high caries levels (Table 5).

DISCUSSION

The 12-year-old schoolchildren from Piracicaba presented in 2005 an average of 1.32 DMFT (Table 1), which is lower than that presented by Brazilian individuals (2.78 DMFT) in the last national epidemiological survey carried out in 2002-2003 [Brazil, 2004]. Other studies conducted in Brazil during the last decade show that DMFT for this age group has ranged from 1.0 to 4.82 [Sales-Peres and Bastos, 2002; Tagliaferro et al., 2004; Bastos et al., 2005; Lucas et al., 2005], which indicates that Piracicaba presents similar or lower caries experience in comparison with national data. Recent international reported data have shown that the DMFT for 12-year-old children is also low, ranging from 1.5 in Iran to 2.33 in Cambodia [Pakshir, 2004; Pieper and Schulte, 2004; van Wyk and van Wyk, 2004].

Since 1971, when the first data on caries experience of children in Piracicaba have been published (8.60 DMFT) [Moreira et al., 1983], a reduction of 85% in the DMFT could be observed. In addition, an important increase in the number of caries-free children could be detected since 1992 when only 25.3% of the children had no caries in permanent dentition [Pereira et al., 1995] in comparison to present data, which shows that 52% of the children presents no caries. The preventive measures such as water fluoridation, the widespread use of fluoridated dentifrices and the preventive programs including oral health education seem to be the main contributors for caries reduction in schoolchildren in Piracicaba [Pereira et al., 2001].

Regarding the Care Index, 75% of all affected teeth were filled, which suggests a good coverage of the oral health services available in Piracicaba. This result can also be supported by the finding that 78.42% of the DMFT index was composed by FT component.

The SiC Index is a good tool for measuring caries level among those individuals more affected by the disease. Considering those high caries-level individuals examined in this study, the SiC index was 3.52. This value is more than two times higher than the mean DMFT for the entire sample. The present results are in line with some recent reported data, which demonstrates that caries experience of those high caries-level individuals is not only higher [Tayanin et al., 2002; Antunes et al., 2004] but also more than two times higher [Nishi et al., 2002; Pieper and Schulte, 2004; Marthaler et al., 2005] than that showed by all the children examined. Bratthall [2000] have proposed a SiC Index less than 3.0 for the year 2015, which is lower than that determined in Piracicaba in 2005. Although the SiC Index in Piracicaba is still high, it has been demonstrating signs of decline - SiC Index=4.15 in 2001 [Pereira et al. unpublished data]. From 2001 to 2005 a reduction of 15.7% in the SiC index can be observed. Even so, children from the SiC group should continuously receive care on dental education and preventive measures.

In addition, the fact that 89% of the disease was concentrated in 33.12% of the sample clearly indicates the polarization phenomenon in the 12-year-olds and the need for targeting specific oral health care at this group. The polarization phenomenon has been verified around the world [Newbrun, 1992; Ellwood and O' Mullane, 1996; Powell, 1998; Tickle, 2002; Antunes et al., 2004] and in fluoridated and non-fluoridated Brazilian towns [Antunes et al., 2004; Bastos et al., 2005]. In addition, dental literature has shown that caries polarization has been associated with socioeconomic, dental health and fluoridated water supply [Antunes et al., 2004].

This study has also attempted to determine the association between caries experience among 12-year-old individuals and demographic characteristics, socioeconomic

factors as well as behavioral variables related to oral health. According to the results, gender and socioeconomic (gender, monthly family income, fathers' educational level) variables related to oral health were the risk indicators of dental caries in permanent dentition (Tables 3 and 5). Children with high family income or fathers' educational level showed not as prone to caries or to being part of the polarization group. Other oral health surveys conducted in 12-year-old individuals during the last years have also found significant association between dental caries and socioeconomic [Campus et al., 2001; Baldani et al., 2004] or behavioral variables related to dental health [Campus et al., 2001].

The regression analysis demonstrated that female individuals were more prone to caries or to 'taking part of the polarization group'. As reported by some studies, females present higher caries experience than males [Alvarez-Arenal, 1998; Petersen and Kaka, 1999; Wu et al., 2003].

The results also indicated that children with low family income or low educational level of the fathers showed more chance of caries or taking part of the polarization group. Other national studies have also shown up the income as the main caries risk indicator [Peres et al., 2000; Baldani et al., 2004]. As pointed out in a recent review on socioeconomic stratification for dental caries and periodontal disease studies, the family income has been considered as an indicative of the access to oral health care, thus influencing many elements that act on the exposition to risks and protector factors of several diseases [Boing et al., 2005]. Other researchers have been claimed that educational level may bring a more complete socioeconomic evaluation, since individuals with greater educational level have best work conditions, greater income and access to health care [Gonçalves et al., 2002]. Therefore, data from the present study suggest both low family

income and/or educational level may be used to identify those individuals who are more prone to caries.

In conclusion, the results of this study clearly indicate a low caries prevalence of 12-year-olds. In addition, gender and socioeconomic variables were risk indicators of caries in permanent dentition not only for the entire sample but also for the polarization group.

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Table 1. DMFT and SiC Indexes for 12-year-old schoolchildren, Piracicaba, Brazil, 2005

Index	Sample size	Interval of Variation	Mean	Standard deviation	Coefficient of variation (%)
DMFT	939	0 – 14	1.32	1.92	145.4
SiC	311	2 –14	3.52	1.86	52.8

Table 2. Univariate analysis of the association between DMFT (dichotomization by the median) and gender, socioeconomic characteristics and behavioral variables related to oral health

Variable	DMFT = 0 n (%)	DMFT > 0 n (%)	p-value
Gender			
Female	267 (48.72)	281 (51.28%)	0.0184
Male	221 (56.52%)	170(43.48%)	
Onset of toothbrushing			
≤ 1 year old	274 (51.99%)	253 (48.01%)	0.9086
> 1 year old	208 (51.61%)	195 (48.39%)	
Monthly family income			
up to 2 minimum wages*	175/375 (46.67%)	200/375 (53.33%)	
over 2 up to 6 minimum wages	228/440 (51.82%)	212/440 (48.18%)	0.0006
> 6 minimum wages	76/113 (67.26%)	37/113 (32.74%)	
Car ownership			
No car	200/422 (47.39%)	222/422 (52.61%)	
1 car	236/432 (54.63%)	196/432 (45.37%)	0.0378
≥ 2 cars	42/70 (60.00%)	28/70 (40.00%)	
Home ownership			
Yes	311/586 (53.07%)	275/586 (46.93%)	0.3413
No	174/349 (49.86%)	175/349 (50.14%)	
Number of people living in the household			
≤ 4 people	263/482 (54.56%)	219/482 (45.44%)	
> 4 people	220/449 (49.00%)	229/449 (51.00%)	0.0894
Father's education			
Incomplete middle-school	198/443 (44.70%)	245/443 (55.30%)	
Incomplete high school	44/68 (64.71%)	24/68 (35.29%)	
Complete high school	85/153 (55.56%)	68/153 (44.44%)	<0.0001
Incomplete undergraduate studies	26/35 (74.29%)	9/35 (25.71%)	
Complete undergraduate studies	36/57 (63.16%)	21/57 (36.84%)	
Mother's education			
Incomplete middle-school	282/593 (47.55%)	311/593 (52.45%)	
Incomplete high school	42/78 (53.85%)	36/78 (46.15%)	
Complete high school	105/174 (60.34%)	69/174 (39.66%)	0.0089
Incomplete undergraduate studies	25/40 (62.50%)	15/40 (37.50%)	
Complete undergraduate studies	30/48 (62.50%)	18/48 (37.50%)	

* Minimum wage at the time of the data collection, approximately US$101.02

Table 3. Stepwise logistic regression with DMFT as dependent variable

Variable	DMFT>0	Odds ratio	Odds ratio (95% Confidence interval)	*p*-value
Gender				
Female	281/548 (51.3%)	Reference		
Male	170/391 (43.5%)	0.679	0.488-0.945	0.0219
Monthly family income				
up to 2 minimum wages*	200/375 (53.3%)	Reference		
over 2 up to 6 minimum wages	212/440 (48.2%)	0.831	0.578-1.198	0.3209
> 6 minimum wages	37/113 (32.7%)	0.347	0.170-0.708	0.0036
Father's education				
Incomplete middle-school	245/443 (55.3%)	Reference		
Incomplete high school	24/68 (35.3%)	0.509	0.268-0.965	0.0386
Complete high school	68/153 (44.4%)	0.194	0.437-1.123	0.1394
Incomplete undergraduate studies	9/35 (4.6%)	0.700	0.059-0.626	0.0061
Complete undergraduate studies	21/57 (36.8%)	0.463	0.206-1.042	0.0627

* Minimum wage at the time of the data collection, approximately US$101.02

Table 4. Univariate analysis of the association between the dependent variable 'taking part of the polarization group' and gender, socioeconomic characteristics and behavioral variables related to oral health

Variable	Polarization group (SiC Group)		p-value
	No n (%)	Yes n (%)	
Gender			
Female	345/548 (63.0%)	203/548 (37.0%)	0.0025
Male	283/391 (72.4%)	108/391 (27.6%)	
Onset of toothbrushing			
≤ 1 year old	355/527 (67.4%)	172/527 (32.6%)	0.7217
> 1 year old	267/403 (66.3%)	136/403 (33.8%)	
Monthly family income			
up to 2 minimum wages*	234/375 (62.4%)	141/375 (37.6%)	
over 2 up to 6 minimum wages	293/440 (66.6%)	147/440 (33.4%)	0.0041
> 6 minimum wages	91/113 (80.5%)	22/113 (19.5%)	
Car ownership			
No car	275/422 (65.2%)	147/422 (34.8%)	
1 car	289/432 (66.9%)	143/432 (33.1%)	0.2213
≥ 2 cars	53/70 (75.7%)	17/70 (24.3%)	
Home ownership			
Yes	392/586 (66.9%)	194/586 (33.1%)	0.8955
No	232/349 (66.5%)	117/349 (33.5%)	
Number of people living in the household			
≤ 4 people	329/482 (68.3%)	153/482 (31.7%)	0.3312
> 4 people	293/449 (65.3%)	156/449 (34.7%)	
Father's education			
Incomplete middle-school	265/443 (59.8%)	178/443 (40.2%)	
Incomplete high school	52/68 (76.5%)	16/68 (23.5%)	
Complete high school	109/153 (71.2%)	44/153 (28.8%)	<0.0001
Incomplete undergraduate studies	31/35 (88.6%)	4/35 (11.4%)	
Complete undergraduate studies	46/57 (80.7%)	11/57 (19.3%)	
Mother's education			
Incomplete middle-school	378/593 (63.7%)	215/593 (36.3%)	
Incomplete high school	52/78 (66.7%)	26/78 (33.3%)	
Complete high school	127/174 (73.0%)	47/174 (27.0%)	0.1116
Incomplete undergraduate studies	30/40 (75.0%)	10/40 (25.0%)	
Complete undergraduate studies	35/48 (72.9%)	13/48 (27.1%)	

* Minimum wage at the time of the data collection, approximately US$101.02

Table 5. Stepwise logistic regression with 'taking part of polarization group' as dependent variable

riable	Polarization group	Odds ratio	95% Confidence interval	*p*-value
Gender				
Female	203/548 (37.04%)	Reference		
Male	108/391 (27.62%)	0.627	0.448-0.877	0.0064
Monthly family income				
up to 2 minimum wages*	141/375 (37.60%)	Reference		
over 2 up to 6 minimum wages	147/440 (33.41%)	0.823	0.575-1.178	0.2876
> 6 minimum wages	22/113 (19.47%)	0.364	0.185-0.718	0.0035
Father's education				
Incomplete middle-school	178/443 (40.18%)	Reference		
Incomplete high school	16/68 (23.53%)	0.565	0.304-1.05	0.071
Complete high school	44/153 (28.76%)	0.610	0.393-0.947	0.028
Incomplete undergraduate studies	4/35 (11.43%)	0.222	0.075-0.659	0.007
Complete undergraduate studies	11/57 (19.30%)	0.469	0.218-1.01	0.053

* Minimum wage at the time of the data collection, approximately US$101.02

CAPÍTULO 3

"The estimate of DMFT index using the most affected teeth by dental caries"

Submetido ao periódico "Community Dentistry and Oral Epidemiology"

Pereira SM[1], Tagliaferro EPS[1], Ambrosano GMB[2], Cortellazzi KL[1], Meneghim MC[2], Pereira AC[2].

[1] Graduate student, Dental Science – Cariology, Piracicaba Dental School, University of Campinas–UNICAMP, Piracicaba, São Paulo, Brazil.

[2] Professor, Piracicaba Dental School, University of Campinas – UNICAMP, Piracicaba, São Paulo, Brazil.

Author responsible for correspondence:

Antonio Carlos Pereira

Faculdade de Odontologia de Piracicaba - UNICAMP

Av. Limeira, 901, Piracicaba, SP, 13414-903, Brazil

Tel: +55 19 34125209 Fax: +55 19 34125218

E-mail: apereira@fop.unicamp.br

ABSTRACT

The aim of this study was to determine the representativeness of each permanent tooth in the DMFT index in 12-year-old schoolchildren attending public and private schools in Piracicaba, SP, Brazil. The random probabilistic sample was composed of 1,763 individuals of which 824 were examined in 2001 and 939 in 2005. Two calibrated dentists performed the examinations in an outdoor setting, under natural light, using mirror and ball point probe, and following the WHO recommendations. The examinations were carried out in an outdoor setting, under natural light, using mirror and ball point probe, following the WHO recommendations, and after toothbrushing. The DMFT distribution (absolute and relative frequencies) was calculated in function of each permanent tooth. The mean and the standard deviation were determined for all teeth (DMFT–real) as well as for the most affected ones (DMFT–partial). Regression models were estimated in function of the most affected teeth using the data collected in 2005 and were validated using the data collected in 2001. The mean (SD) for DMFT–real was 1.7 (2.08) in 2001, and 1.3 (1.9) in 2005. The DMFT-partial, which was estimated by the first molars, was 1.4 (1.6) in 2001, and 1.1 (1.4) in 2005. By the status of the first molars the DMFT-partial could be estimated in 82% and 81.5%, in 2001 and 2005, respectively. The regression equations estimated a DMFT of 1.67 in 2001, which represents 98.2% of the DMFT-real. The occlusal surfaces were the most attacked (60.4%) followed by the buccal and distal surfaces. In conclusion, the status of the first molars was determinant to estimate the DMFT index, demonstrating, thus, their susceptibility to caries in 12-year-old individuals.

Key words: DMF Index; estimation; first molars.

INTRODUCTION

The worldwide reduction of caries prevalence has been occurring along with changes in its epidemiological profile. Such changes can be easily observed in recent epidemiological studies (Pitts et al., 2002; Antunes et al., 2004; Marthaler et al., 2005), which present data on severity, prevalence and incidence of dental caries, also emphasizing the pattern and distribution of the disease (Pine et al., 2003).

The concentration of the disease in a minority (Vehkalahti et al., 1997; Powell, 1998; Bratthall, 2000; Tickle, 2002), the concentration of lesions on specific surfaces/teeth, the changes on pattern as well as on progression speed of lesions (Newbrun, 1992; Burt, 1998; Batchelor & Sheiham, 2004) are the clinical consequences more frequently observed. Such changes have been attributed to the widespread use of fluorides, alterations in pattern of sugar consumption, and implementation of preventive and educative measures in oral health care services (Krasse, 1996; Bratthall et al., 1996).

Data concerning dental health in 12-year-old individuals have been published all over the world, demonstrating both, a trend of caries decline experience and the inequality in the distribution of the disease (Irigoyen & Sanchez-Hinojosa, 2000; Chawla et al., 2000; Bonecker & Cleaton-Jones, 2003; Marthaler et al., 2005; Pakshir, 2004; van Wyk & van Wyk, 2004; Pieper & Schulte, 2004).

Studies conducted as early as the 40s have demonstrated that some teeth present higher caries attack than others, serving as a springboard to the development of some caries indexes for assessing the disease experience in oral health surveys (Viegas, 1969; Guimarães, 1971; Rodrigues et al., 1989). The simplified indexes, focusing on the most

attacked teeth, have been considered an alternative to the DMFT index and its aim is to improve the efficiency of public health services in a secure and inexpensive way. The use of these indexes has been discussed in recent studies (Cypriano et, 2004; Cypriano et al., 2005), in which they are considered to have good applicability in two situations. First, when a general knowledge of the oral health status in a population is required. Second, it can be used for faster and secure assessment of implemented oral health program when much detail is considered unnecessary.

Surveys on dental caries have been carried out periodically in 12-year-olds in Piracicaba (Brazil) in order to verify the trends of the disease and its distribution (Moreira et al., 1983; Pereira et al., 1995; Kozlowski, 2001). However, up to this date, no study has used different methods of assessment/estimate of caries experience other than the DMFT index. Therefore, the objective of this study was to determine in a random sample of 12 year-olds in Piracicaba the representativeness of each permanent tooth in the DMFT index.

MATERIALS AND METHODS

Ethical aspects

The Research Ethics Committee of the Piracicaba Dental School (UNICAMP) approved two surveys, from which data were used in this study (protocols #31/2000; #148/2003).

Sample

The sample size was defined in 1,763 twelve-year-old schoolchildren attending private and public schools in 2001 (n=824) and in 2005 (n=939). The schools were selected

by cluster sampling techniques from official records supplied by the Local Department of Education, proportionally considering the number the schoolchildren attending private and public schools. Those who returned the informed consent form, and also presented no systemic disease, participated in the present study.

Methods

The examinations were performed by a dentist, who was previously calibrated by a "Gold Standard", was also an expert in oral health surveys. The intra-examiner reproducibility in the pilot phase and on the main surveys were assessed by Kappa statistics, reaching in both values higher than 0.91. The individuals were examined, in an outdoor setting, under natural light, with plane mouth mirror and CPI probe (ball point), after air-drying and previous toothbrushing supervised by a dental hygienist, following the World Health Organization recommendations (WHO, 1997). Duplicate examinations were also conducted in 10% of the sample throughout the study reaching good intra-examiner reliability (Kappa>0.91).

Data analysis

The DMFT distribution (absolute frequency, cumulative absolute frequency and cumulative relative frequency) was calculated in function of each permanent tooth in 2001 and 2005 separately, in order to identify the most affected teeth by caries. The DMFT index (mean and standard deviation) was calculated for all individuals (DMFT-real) examined in 2001 and 2005. The mean and standard deviation were also determined by considering the most affected teeth in each survey, namely here DMFT-partial. Regression models were estimated in function of the most affected teeth (MODEL) in 2005 and were validated (VALIDATION) using the data from 2001. The mean number of decayed, missing and

filled teeth, obtained by the regression models, was called DMFT-estimated. Finally the paired t-test was used for comparison between DMFT-real and DMFT-estimated.

RESULTS

The DMFT distribution showed that the first permanent molars (teeth 46, 36, 16 and 26), followed by the lower second permanent molars (teeth 37 and 47) were the most affected teeth by caries in both surveys (2001 and 2005). Moreover, it can be verified that the sequence of the most affected teeth were the same in both surveys, and also that the absolute frequency, cumulative absolute frequency, and cumulative relative frequency were also similar (Table 1) in 2001 and 2005.

Table 2 shows the means and standard deviations of DMFT-real (considering all teeth) and DMFT-partial (considering the most affected teeth = 46, 36, 16, 26) for each survey. The means (standard deviation) of DMFT-real and DMFT-partial (considering only the first molars) were 1.7 (2.08), 1.4 (1.6) in 2001, and 1.3 (1.90), 1.1 (1.40) in 2005, respectively (Table 2). The status of first permanent molars allowed estimating in 82.0% and 81.5% the DMFT-real in 2001 and 2005, respectively (Table 1).

Table 3 shows the regression equations in function of the most affected teeth, starting with the most attacked tooth, using data from 2005 (MODEL). Thus, the first equation included tooth 46, which was the most affected; the second equation was composed of teeth 46+36, and successively. Table 3 also demonstrates that 50% of variation of DMFT-real (R^2 - coefficient of variation) was explained by tooth 46, while 78% was explained by first permanent molars.

Table 4 demonstrates that while the DMFT-real was 1.7, the DMFT-estimated by the tooth 46 was 1.23 in 2001. The values of DMFT-estimated for teeth 46+36, 46+36+16 and 46+36+16+26 did not differ statistically from the DMFT-real ($p>0.1$).

Table 5 shows the most affected surfaces by caries in 2005. The occlusal surfaces concentrated most of the decayed, missing or filled lesions (60.4%).

DISCUSSION

The epidemiological profile of caries in individuals aged 12 has been studied worldwide, demonstrating a declining trend in caries prevalence and an increasing inequality in its distribution (Nishi et al., 2002; Tayanin et al., 2002; Pieper & Schulte, 2004). Therefore, teeth and surfaces may present different susceptibilities to caries (Hannigan et al., 2000; Bourgeois et al., 2004).

The present study demonstrated that the first permanent molars were prone to the majority of the lesions, concentrating 82% and 81.5% of the DMFT-real observed in 2001 and 2005, respectively. As the disease levels decline, a greater proportion of affected first molars could be observed. The caries susceptibility of first molars was also detected in epidemiological surveys in Brazil and in other countries (Pereira et al., 1995; Meneghim et al., 1999; Bajomo et al., 2004). Higher caries prevalence in lower first molars was observed in this study (46 and 36), corroborating data from other studies (Vieira & Rosenblatt, 2003; Ma et al., 2005). Such findings make evident the representativeness of first molars in determining the DMFT index, reflecting the concentration of lesions in specific teeth of 12-year-old schoolchildren.

The concentration of caries lesions in some dental surfaces has also been reported along with caries decline (Burt, 1998; Batchelor & Sheiham, 2004). In the present study, the analysis of the most affected dental surfaces was carried out using data from 2005 only, since the DMFS index was not used for caries registration in 2001. Out of all affected surfaces, 60.4% were occlusal, followed by buccal, and finally by distal surfaces. In a clinical trial aiming at classifying the caries susceptibility of dental surfaces in 11 and 12-year-olds using the survival time, i.e. the time in which the tooth remains sound in the mouth since the beginning of its eruption, (Hannigan et al., 2000) it has been observed that the survival time varies according to teeth and surfaces, and also, that the occlusal surfaces of first molars remained sound for shorter periods of time in comparison to the surfaces of other teeth.

The greater caries occurrence in occlusal surfaces and in first molars can been explained by the easy stagnation of debris in pits and fissures (Carvalho et al., 1989), which may also present greater porosity and low degree of enamel maturation after eruption (Fejerskov et al., 1984; Driessens et. al., 1985).

Regarding regression equations, when including the first permanents molars, the DMFT-estimated was 1.67, which did not differ statistically (p=0.4683) from the DMFT-real (=1.7). Such finding can be supported by the fact that 78% of the variation of the DMFT (R^2) in 2005 could be attributed to the first permanent molars (Table 3). These equations can be used in surveys when much detail is not necessary, and also in areas with low caries prevalence, where the examination of specific teeth, e.g. the first permanent molars, will suffice.

Viegas (1969) developed three simplified methods to estimate caries prevalence in children aged 7 and 12 using regression equations. In Method I the DMFT is estimated by examining only tooth 46. In Method II the DMFT is estimated with the scores of teeth 46, 11 and 21. Method III is a simplified method to estimate the DMFT in 7 and 12-year-olds examining tooth 46 at 7 years of age and teeth 46, 11 and 21 at 11. The author selected the lower first molars and the central incisors for their caries attack, and also for the fact that the DMFT increases with age. In the present study the selection of teeth for entering the regression equations was based on the most affected teeth, since it is essential to consider the disease distribution nowadays.

Along with caries decline, one can observe that the majority of 12-year-old individuals are caries-free and the minority (about 1/3 of the population) concentrates most cavitated lesions (Bratthall., 2000; Pieper & Schulte, 2004; Nishi et al., 2002; Marthaler et al., 2005). As a result, changes in the distribution of the disease could be verified among individuals (Tayanin et al., 2002; Antunes et al., 2004), teeth, and dental surfaces (Fennis-le et al., 1998). The high-caries level individuals have presented their first permanent molars as the most affected teeth, constituting the greatest part of the DMFT index (Alvarez-Arenal et al., 1998; Batchelor & Sheiham, 2004).

Identifying the most affected teeth and surfaces is important for oral health public services, so that health actions with preventive measures based on such more susceptible teeth and surfaces (Hannigan et al., 2000) can be carried out. To reduce caries prevalence in occlusal surfaces of first permanent molars would probably optimize the overall caries decline. Preventive measures such as topic fluoride applications, sealants application,

dietary and oral hygiene counseling are important methods to prevent dental caries (Fennisle et al., 1998).

In conclusion the status of first permanent molars is determinant to estimate the DMFT index. Therefore, oral health care targeting these teeth could more effectively help in the control of caries incidence and the reduction of the disease prevalence in schoolchildren.

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Table 1. DMFT distribution in function of each permanent tooth in 2001 and in 2005

Tooth	Survey 2001			Survey 2005		
	Absolute frequency	7	Cumulative relative frequency (%)	Absolute frequency	Cumulative absolute frequency	Cumulative relative frequency (%)
46	337	337	24.1	289	289	23.8
36	323	660	47.2	283	572	47.2
16	252	912	65.2	212	784	64.6
26	235	1147	82.0	205	989	81.5
37	52	1199	85.7	38	1027	84.7
47	52	1251	89.4	30	1057	87.1
14	20	1271	90.9	18	1075	88.6
35	18	1289	92.1	18	1093	90.1
24	16	1305	93.3	16	1109	91.4
17	11	1316	94.1	15	1124	92.7
15	11	1327	94.9	14	1138	93.8
34	10	1337	95.6	13	1151	94.9
25	10	1347	96.3	12	1163	95.9
27	10	1357	97.0	11	1174	96.8
45	10	1367	97.7	11	1185	97.7
21	9	1376	98.4	6	1191	98.2
22	7	1383	98.9	6	1197	98.7
44	6	1389	99.3	6	1203	99.2
11	6	1395	99.7	5	1208	99.6
23	3	1398	99.9	2	1210	99.8
31	1	1399	100.0	1	1211	99.8
41	0	1399	100.0	1	1212	99.9
42	0	1399	100.0	1	1213	100.0
13	0	1399	100.0	0	1213	100.0
12	0	1399	100.0	0	1213	100.0
33	0	1399	100.0	0	1213	100.0
32	0	1399	100.0	0	1213	100.0
43	0	1399	100.0	0	1213	100.0

Table 2. DMFT-real and DMFT-partial (first molars) in 2001 and in 2005.

Index	Year			
	2001		2005	
	Mean	Standard deviation	Mean	Standard deviation
DMFT-real	1.7	2.7	1.3	1.9
DMFT-partial (first molars)	1.4	1.6	1.1	1.4

Table 3. Regression models in function of the most affected teeth in 2005.

Teeth	Regression models	R^2	p-value
46	Y=0.41077+2.94214 x CPOD46	0.5015	<0.0001
46+36	Y=0.21207+1.81307x CPOD46+36	0.6221	<0.0001
46+36+16	Y=0.07566+1.48601x CPOD46+36+16	0.7388	<0.0001
46+36+16+26	Y=0.03627+1.21535 x CPOD46+36+16+26	0.7841	<0.0001
46+36+16+26+37	Y=0.00491+1.19902 x CPOD46+36+16+26+37	0.8292	<0.0001
46+36+16+26+37+47	Y=0.00459+1.16527 x CPOD46+36+16+26+37+47	0.8553	<0.0001
46+36+16+26+37+47+14	Y=0.00137+1.114857 x CPOD46+36+16+26+37+47+14	0.8734	<0.0001

Table 4. Mean and standard deviation of DMFT-estimated obtained in the regression models with data from 2001.

Teeth	DMFT-estimated		95% Confidence interval	p-value*
	Mean	Standard deviation		
46	1.23	1.48	1.13-1.31	0.065
46+36	1.60	1.80	1.48-1.71	0.3527
46+36+16	1.62	1.68	1.51-1.72	0.1676
46+36+16+26	1.67	1.98	1.53-1.80	0.4683
46+36+16+26+37	1.74	2.05	1.60-1.85	0.2327
46+36+16+26+37+47	1.81	2.14	1.67-1.93	< 0.0001
46+ 36+ 16+26+37+47+14	1.73	2.08	1.60-1.85	0.25
46+ 36+ 16+26+37+47+14+35	1.75	2.10	1.60-1.86	0.07

*Paired t-test compared DMFT-estimated and DMFT-real (mean 1.70; standard deviation 2.08)

Table 5. Distribution of dental surfaces with caries experience in 2005

Surfaces	Absolute frequency	Cumulative absolute frequency	Cumulative relative frequency (%)
Occlusal	1110	1110	60.4
Buccal	273	1383	75.2
Distal	109	1492	81.1
Lingual	229	1721	93.6
Mesial	117	1838	99.9
Incisal	1	1839	100.0

CONSIDERAÇÕES FINAIS

Os resultados demonstram que os escolares de 12 anos de Piracicaba apresentaram boas condições de saúde bucal na média geral, entretanto uma minoria da população concentra a maior parte da doença. Estes indivíduos apresentam mais que o dobro da experiência de cárie que os da amostra toda, isto pode ser observado tanto para o levantamento de 2001 quanto para o de 2005. A similaridade dos dados também ocorre em relação aos indicadores de risco relacionados à cárie, sendo que variáveis socioeconômicas e comportamentais foram associadas à cárie e ao grupo de polarização em ambos os levantamentos.

Foi possível classificar e identificar os indivíduos que constituem o grupo de polarização por meio de indicadores sociais, econômicos e comportamentais, com o intuito de fornecer subsídios para que os programas já existentes mantenham seus padrões e que novas medidas sejam direcionadas ao grupo que concentra os maiores níveis da doença. Essas desigualdades sociais e econômicas podem ser minimizadas por meio de cuidados educativos e preventivos precoces. O índice SiC (Significant Caries Index) mostrou-se um importante auxiliar para o Índice CPOD na análise dos dados de saúde bucal, já que o mesmo visa dar atenção aos indivíduos com os mais altos escores da doença.

No capítulo 3 foi possível concluir que o status dos primeiros molares é determinante para a estimativa do índice CPOD, demonstrando que a maioria das lesões cariosas estão concentradas nestes dentes na idade de 12 anos. Estes dados demonstram uma alta representatividade dos primeiros molares permanentes no índice CPOD para esta amostra, pois foi possível se estimar em 98,2% o CPOD real utilizando-se equações de regressão. Dessa forma, essas equações podem ser utilizadas em levantamentos onde não seja necessário um detalhamento maior das informações, podendo então, ser examinados somente alguns dentes para este grupo etário, tendo como finalidade o aumento da produtividade e rendimento em saúde pública.

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Vehkalahti M, Tarkkonen L, Varsio S, Heikkila P. Decrease in and polarization of dental occurrence among child and youth populations, 1976-1993. Caries Res 1997;31:161-165.

ANEXOS

De:	"Community Dental Health" <cdh@ucc.ie>
Para:	"'Stela Pereira'" <aletsmp@yahoo.com.br>
Assunto:	RE: Manuscript_Submission
Data:	Sat, 28 Jan 2006 13:20:53 -0000

Thank you Dr. Pereira - we will be in contact again shortly about your manuscript.

Regards
Colette Spicer
Editorial Assistant
-----Original Message-----
From: Stela Pereira [mailto:aletsmp@yahoo.com.br]
Sent: 26 January 2006 02:38
To: cdh@ucc.ie
Subject: Manuscript_Submission

Dear Editor,

Please find enclosed a manuscript by S.M. Pereira, G.M.B. Ambrosano, V Pardi, K.L. Cortellazzi F.C. Kozlowski M.C. Meneghim, Pereira AC, with the title "*Socioeconomic, behavioral and dental health care variables related to high caries-level individuals",* which we would like to submit to the *Community Dental Health.*

Here are the following attachments: manuscript text as PC-word file and covering letter.

We hope the reviewers will decide favourably and we await the acknowledgement of receipt of the above manuscript.

Yours sincerely,

Stela Márcia Pereira

Data:	Thu, 26 Jan 2006 22:57:03 +0100 (CET)
De:	r.p.shellis@bristol.ac.uk
Para:	aletsmp@yahoo.com.br
Assunto:	Ms. No. 200601020, Caries Research

MS: 200601020

Dear Ms. Pereira,

Thank you for submitting your manuscript entitled "Dental Caries in 12-year-old Schoolchildren and its Relationship with Socioeconomic and Behavioral Variables" to "Caries Research". It will now be forwarded to our reviewers and we shall inform you as soon as possible of the decision reached by the editorial board. The manuscript reference number is 200601020. Please use this number on all correspondence about the manuscript, which should be sent to the "Caries Research" editorial office at
the address listed below.

For information regarding the status of your manuscript and for future submissions you can access this system by logging into the journal's online peer review system as follows:

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Logon Name: stela
Password: aletsmp

With kind regards,

R P Shellis
(Editor-in-Chief, Caries Research)
Division of Restorative Dentistry
Bristol University Dental School, Bristol BS1 2LY, U.K.
Fax. +44 117-928-4778
Tel. +44 117-928-4328
r.p.shellis@bristol.ac.uk

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 "**Diferentes métodos de estimativa da prevalência de cárie dentária, em escolares de 12 anos**", protocolo nº **148/2003**, dos pesquisadores **STELA MÁRCIA PEREIRA, ALTAIR ANTONINHA DEL BEL CURY, ANTONIO CARLOS PEREIRA e TATIANA PEREIRA**, satisfaz as exigências do Conselho Nacional de Saúde – Ministério da Saúde para as pesquisas em seres humanos e foi aprovado por este comitê em 22/07/2005.

The Research Ethics Committee of the School of Dentistry of Piracicaba - State University of Campinas, certify that project "**Different methods of judgment of caries prevalence in 12-year school children**", register number **148/2003**, of **STELA MÁRCIA PEREIRA, ALTAIR ANTONINHA DEL BEL CURY, ANTONIO CARLOS PEREIRA and TATIANA PEREIRA**, 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 22/07/2005.

Cinthia Pereira Machado Tabchoury

Secretária
CEP/FOP/UNICAMP

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.

UNIVERSIDADE ESTADUAL DE CAMPINAS

FACULDADE DE ODONTOLOGIA DE PIRACICABA

Ilmo (a). Coordenador (a)/ Diretor (a)

Prof. (ª). _____

Escola _____– SP

Nós, Stela Márcia Pereira e Antonio Carlos Pereira, do Programa de Pós-Graduação da FOP/UNICAMP, solicitamos através deste, a permissão para a realização da pesquisa intitulada: " Epidemiologia da cárie dentária em escolares de 12 anos em Piracicaba: estimativas e indicadores de risco" nas dependências deste estabelecimento de ensino. Para tanto, necessitaremos da lista dos alunos regularmente matriculados na faixa etária de 12 anos, sendo que os exames bucais a serem realizados, ocorrerão no pátio, dentro do horário de funcionamento da escola. A participação de sua escola nesta pesquisa será deveras relevante para a elucidação das condições da saúde oral das crianças desta cidade, bem como, em específico à de cada uma das participantes da pesquisa.

Certos de sua compreensão, desde já, nos colocamos à sua disposição para eventuais esclarecimentos que se fizerem necessários, seguindo em anexo, cópia do certificado de aprovação da referida pesquisa, expedido pelo Comitê de Ética em Pesquisa da FOP/UNICAMP.

Atenciosamente,

- Stela Márcia Pereira - Pós-Graduanda da FOP/UNICAMP
- Antonio Carlos Pereira - Prof. Dr. da FOP/UNICAMP

_____

Diretor (a)/ Coordenador (a)

Solicitamos aos pais ou responsável pelo aluno _____

autorização para a participação dele (a), na pesquisa intitulada: "Epidemiologia da cárie dentária em escolares de 12 anos m Piracicaba: estimativas e indicadores de risco", de responsabilidade dos pesquisadores: Stela Márcia Pereira e Prof. Dr. Antonio Carlos Pereira. Salientamos que seu filho (a) será submetido a um exame clínico bucal, no pátio da escola, no qual será feita uma avaliação de suas condições de saúde bucal. Se for verificada a presença de cárie, as crianças terão os pais ou responsáveis avisados e serão encaminhadas para o tratamento odontológico.

Declaramos também, que seu filho (a) não será submetido (a) a nenhum desconforto ou risco, sendo que a participação dele (a) nesta pesquisa será muito importante para a determinação das condições de saúde bucal da população desta cidade. A participação dele (a) é voluntária, podendo ser retirada a qualquer momento da execução da pesquisa, sem prejuízo algum para ele (a). Os dados coletados ficarão guardados em sigilo, não sendo divulgado o nome dele (a) em hipótese alguma, estando disponíveis ao senhor (a) a qualquer momento. Maiores informações poderão ser conseguidas no telefone abaixo, bem como, dúvidas sanadas junto ao Comitê de Ética em Pesquisa da FOP/UNICAMP, o qual aprovou esta pesquisa em sua íntegra.

Diante do exposto, permito a realização dos exames de cárie dentária em meu filho (a).

_____ _____

Nome legível do responsável ASS: Assinatura do responsável

INFORMAÇÕES SOBRE A PESQUISA

TÍTULO DA PESQUISA: "Epidemiologia da cárie dentária em escolares de 12 anos em Piracicaba: estimativas e indicadores de risco".
PESQUISADORES: Prof. Dr. Antonio Carlos Pereira e Stela Márcia Pereira.

LOCAL: Escolas da rede pública e privada de ensino da cidade de Piracicaba-SP

1. INTRODUÇÃO: Por favor, leia este termo cuidadosamente, pois as informações a seguir irão descrever esta pesquisa e sua função nela como participante. Caso tenha qualquer dúvida sobre este estudo ou termo, você deverá esclarecê-la com os pesquisadores responsáveis pelo trabalho.

2. PROPÓSITO: Participar de uma pesquisa epidemiológica cujo objetivo é, através da realização de um levantamento epidemiológico, avaliar a prevalência de cárie em escolares de 12 anos e sua distribuição entre os diferentes extratos sócio-econômicos da mesma, além de avaliar quais são os dentes mais afetados pela cárie nesta população.

3. DESCRIÇÃO DO ESTUDO: Irão participar deste estudo escolares de 12 anos de idade provenientes de escolas da rede pública e privada de ensino da cidade de Piracicaba, sendo que serão examinadas ao todo 800 crianças. Os pacientes que concordarem em participar da pesquisa serão examinados por um único cirurgião dentista. Em caso de necessidade de tratamento, entraremos em contato com os pais ou responsáveis, além de encaminhar estas crianças para o tratamento.

4. DESCONFORTOS E RISCOS: Declaramos que seu filho não será submetido a nenhum desconforto ou risco, os métodos utilizados para avaliação são atraumáticos, não invasivos e o tratamento odontológico integral não serão prejudicados pela pesquisa.

5. BENEFÍCIOS ESPERADOS: O paciente receberá, através da pesquisa, avaliação para verificação das condições bucais em relação à cárie, possibilitando o diagnóstico precoce de possíveis problemas existentes, sendo que as crianças que apresentarem problemas serão encaminhadas para tratamento. Os dados coletados estarão disponíveis ao responsável do aluno (a), a qualquer momento.

6. INFORMAÇOES: Os voluntários e seus pais ou responsável têm garantia de que receberão respostas a qualquer pergunta ou esclarecimento acerca dos procedimentos, benefícios e aspectos pertinentes à pesquisa.

7. RETIRADA DE CONSENTIMENTO: Os voluntários e seus pais ou responsável têm a liberdade de retirar seu consentimento a qualquer momento e deixar de participar do estudo.

8. GARANTIA DE SIGILO: Os dados coletados de seu (sua) filho (a) têm finalidade exclusivamente científica, sendo guardados em sigilo, não sendo divulgado o nome dele (dela), em hipótese alguma, estando disponíveis ao responsável do aluno (a), a qualquer momento. 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.

9. RESSARCIMENTO: Não há gasto previsto em decorrência da participação dos voluntários na pesquisa uma vez que os exames serão realizados no pátio das escolas.

12. ASPECTO LEGAL: Maiores informações, poderão ser conseguidas no endereço abaixo, bem como dúvidas sanadas junto ao Comitê de Ética em Pesquisa da FOP/UNICAMP, o qual aprovou esta pesquisa em sua íntegra.

Endereço- Av. Limeira, 901 CEP/FOP 13414-903- Piracicaba-SP.

Havendo alguma dúvida, entrar em contato com os responsáveis pela pesquisa:

Pesquisador: Stela Márcia Pereira

Orientador: Prof. Dr.Antonio Carlos Pereira

Faculdade de Odontologia de Piracicaba - FOP – UNICAMP

Av. Limeira , 901 CEP. 13414-903

Telefone de contato FOP-UNICAMP / 3412-5209

_____"QUESTIONÁRIO"_____

*** Solicitamos PREENCHER COM "X" A LETRA CORRESPONDENTE A SUA RESPOSTA EM CADA QUESTÃO do presente questionário, sendo que os dados coletados serão tratados de forma estritamente confidencial, não sendo identificados em hipótese alguma.**

1. SITUAÇÃO ECONÔMICA DA FAMÍLIA (Renda familiar mensal)

A. ( ) até R$ 520,00
B. ( ) de R$ 521,00 a R$ 1040,00
C. ( ) de R$ 1041,00 a R$ 1560,00
D. ( ) de R$ 1561,00 a R$ 2600,00
E. ( ) de R$ 2601,00 a R$ 3900,00
F. ( ) de R$ 3901,00 a R$ 5200,00
G. ( ) Acima de R$ 5200,00

2. NÚMERO DE PESSOAS NA FAMÍLIA (Residentes na mesma casa)

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

3. GRAU DE INSTRUÇÃO DOS PAIS OU RESPONSÁVEIS

	PAI ou RESPONSÀVEL	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

4. HABITAÇÃO (Moradia)

A.( ) Residência própria quitada
B.( ) Residência própria com financiamento a pagar
C.( ) Residência cedida pelos pais ou parentes
D.( ) Residência cedida em troca de trabalho
E.( ) Residência alugada
F.( ) Residência cedida por não ter onde morar

5. POSSE DE AUTOMÓVEL:

( ) Não possui ( ) Possui um automóvel ( ) Possui 2 ou mais automóveis

6. PROFISSÃO DO CHEFE DA FAMÍLIA (Mencionar mesmo que desempregado)

- Profissão_____

7. SEU FILHO JÁ FOI AO DENTISTA ALGUMA VEZ?

A.( )Nunca foi ao dentista B. ( )Não vai regularmente C.( )6 em 6 meses D.( )1 vez por ano E.( )2 em 2 anos

8. QUANTAS VEZES SEU FILHO ESCOVA OS DENTES POR DIA?

A.( ) Escova 1 vez por dia B. ( ) Duas vezes por dia C. ( ) 3 vezes ou mais ( )Não possui escova

9. DESDE QUE IDADE SEU FILHO ESCOVA OS DENTES?

A.( ) antes de um ano B. ( ) 1 ano C. ( ) 2 anos D. ( ) 3 anos E. ( ) 4 anos F. ( ) 5 anos ou mais

* Para a classificação sócio-econômica das crianças, os cinco fatores analisados, correspondentes às cinco primeiras perguntas do questionário, receberão um sistema de pontuação

das respostas, cujo somatório irá possibilitar um escore individual e conseqüentemente a hierarquização dos voluntários dentro de uma das seis classes sociais propostas. Cada um dos fatores apresenta um objetivo específico e uma ponderação, tanto em termos de peso proporcional na avaliação geral como um número mínimo e máximo de pontos possíveis, descritos abaixo:

A) Objetivo dos fatores

Fator 1- Procura identificar o nível de renda familiar

Fator 2- Procura identificar as condições econômicas de vida, quando comparado ao número de pessoas com a renda familiar (fator 1).

Fator 3- Procura identificar o grau de instrução das pessoas do meio em que a criança vive ou foi criado.

Fator 4- Procura identificar a situação de posse da moradia da família.

Fator 5- Procura identificar através da profissão e em um mesmo tempo, o nível social, cutural e econômico do chefe da família.

B) Ponderação dos fatores

	Peso	**Pontos mínimos**	**Pontos máximos**
Fator 1	30%	3,0	30,0
Fator 2	20%	2,0	20,0
Fator 3	25%	2,5	25,0
Fator 4	10%	1,0	10,0
Fator 5	15%	1,5	15,0

C) Ponderação dos graus

Fator 1- Cada item deste fator apresenta um valor de pontuação.

A) 3,0 B) 7,5 C) 12,0 D) 16,5 E) 21,0 F) 25,5 G) 30,0

Fator 2- O valor é obtido pela transposição entre o fator 2 e o fator 1

F2 \ F1	A	B	C	D	E	F	G
A	5,0	7,4	9,8	12,2	14,6	17,0	20,0
B	4,0	6,4	8,8	11,2	13,6	16,0	19,0
C	4,0	6,2	8,4	10,6	12,8	15,0	18,0
D	3,0	5,2	7,4	9,6	11,8	14,0	17,0
E	3,0	5,0	7,0	9,0	11,0	13,0	16,0
F	2,0	4,0	6,0	8,0	10,0	12,0	15,0

Fator 3- O valor corresponde à média obtida entre o pai e a mãe (Somam-se e dividi- se por dois. Na ausência de uma das respostas considera-se a existente).

A) 2,5 B) 5,0 C) 7,5 D) 10,0 E) 12,5 F) 15,0G) 17,5 H) 20,0 I) 22,5 J) 25,0

Fator 4- Cada item deste fator apresenta um valor de pontuação.

A) 10,0 B) 8,2 C) 6,4 D) 4,6 E) 2,8 F) 1,0

Fator 5- Cada item deste fator apresenta um valor de pontuação.

A) 15,0 B) 13,5 C) 12,0 D) 10,5 E) 9,0 F) 7,5 G) 6,0 H) 4,5 I) 3,0 J) 1,5

Enquadra- se a profissão citada dentro desta lista, ou em seu correspondente:

A. ( ) Empresário de grande porte (em qualquer ramo)

B. ( ) Profissional Liberal e Empresário de médio porte

C. ( ) Funcionário em ocupações de nível superior

D. ( ) Empresário de pequeno porte

E. ( ) Funcionário em ocupações de nível médio

F. ( ) Profissional autônomo (Vendedor, Corretor e outros)

G. ( ) Funcionário em ocupações de nível intermediário

H. ( ) Profissional autônomo operacional (Marceneiro, Pedreiro e outros)

I. ( ) Funcionário em ocupações auxiliares (Ajudantes, trabalhador rural)

J ( ) Ambulante, Safrista, Trabalho eventual (Bicos)

Obtido o escore individual que pode variar entre 10,0 e 100,0, dentro da pontuação determinada no item B (Ponderação de fatores), classifica- se a criança dentro de uma das 6 classes sociais seguintes:

Pontos	**Classe sócio- econômica**	**Código**
10,0 a 25,0	classe baixa inferior	F
25,1 a 40,0	classe baixa	E
40,1 a 55,0	classe média inferior	D
55,1 a 70,0	classe média	C
70,1 a 85,0	classe média superior	B
85,1 a 100,0	classe alta	A