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Dental caries and treatment needs in adolescents from the state of São Paulo, 1998 and 2002

ABSTRACT

OBJECTIVE: To evaluate indicators of prevalence and severity of dental caries and treatment needs in adolescents.

METHODS: Data were obtained from oral health epidemiological surveys carried out in the state of Sao Paulo with adolescents from 12 to 18 years old. Dental caries experience was assessed using DMFT Index and the need for treatment was assessed using World Health Organization criteria. Significant caries index was used to define dental caries experience of one third of the group that presented greater experience of the disease. For 12-year-old group, examinations occurred in public and private schools, in 1998 (N= 9,327) and 2002 (N= 5,782), while 18-year-old group was examined in their households (N= 5,195 in 1998 and N= 257 in 2002).

RESULTS: At 12 years old, DMFT index was 3.72 in 1998 and 2.52 in 2002, whereas at 18 years old, it was 8.64 and 7.13, respectively. Significant caries index at 12 was 7.40 (1998) and 5.62 (2002), at 18 it was 15.05 and 12.19, respectively. There was an increase in the need for surface restorative care at 12 year old ($p<0.0001$) and of sealants at 18 year old ($p<0.0001$).

CONCLUSIONS: There was a decrease in dental caries among adolescents and most dental treatment needs were little complex

DESCRIPTORS: Adolescent. Dental Caries, epidemiology. DMF Index. Dental Health Surveys. Oral Health.

INTRODUCTION

There was a significant reduction in dental caries prevalence in most developing countries as of the 70's,[9] this has also been observed in Brazil through epidemiological surveys conducted in 1986 and 1996.[7]

Approximately 70% of world countries have reached the goal proposed by the World Health Organization (WHO) 20 years ago that DMFT for 12-year-olds should not exceed 3.[10] However, national data on real oral health condition at 18 are scarce,[4] an age in which adolescents are no longer included in preventive programs for school children. The few epidemiological studies on dental caries have been performed almost only in developed countries.[4] In the project *Saúde Bucal Brasil (SB Brasil)* (Oral Health Brazil) examination of the age group from 15 to 19 was conducted for the first time in a nationally based epidemiological survey.

Decrease in dental caries in the world has occurred together with a skewed distribution of caries prevalence, with a small part of the population concentrating

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most caries or need for dental treatment.[13] Due to this skewed distribution, a new index called Significant Caries Index (SiC) was introduced in 2000,[1] to focus attention to those individuals with higher caries indexes in the population studied. This index is calculated as of the DMFT values (mean decayed, missing, and filled teeth) and the third of the population with higher DMFT scores are the bases to calculate SiC. Using SiC aims at assessing oral health in the group with higher caries prevalence, since DMFT, because it incorporates caries free people in its calculation, dilutes the results for one population.[1]

Thus, the objective of the present study was to assess prevalence and severity indicators of dental caries in adolescents and the needs for dental treatment.

METHODS

Cross-sectional study using secondary data from epidemiological surveys on oral health conducted in the State of São Paulo in the years 1998 and 2002.[a,b] Selection of the sample in 1998, both for 12 and 18 year-olds was performed in public and private schools, and then individuals were randomly chosen. Dental examinations for these two age groups were performed in schools.

In 2002, 12 year-old individuals were selected similarly to that process of 1998, and dental examinations were also performed in schools. For 18 year-olds, urban courts and rural areas were randomly chosen and the number of households to be surveyed was estimated. All individuals from this age found in the households were examined. To control non-response rate we recommended returning to the households.

We have examined 9,327 12-year-old adolescents in 1998 and 5,782 in 2002. In the 1998 survey, 5,195 adolescents were examined and in 2002, 1,825 adolescents in the age group from 15 to 19 years old, the 257 18-year-old adolescents are included in this group, according to the parameters established for the sample size in the surveys mentioned.

Calibration process of the team in 1998 encompassed approximately 40 hours; the same process was performed in 2002, considering a maximum amount of five examiners per city with a minimum of 24 hours of work. In both cases intra e interagreement of examiners was assessed to verify reproducibility of the study.

Dental examinations followed the methodology proposed by the World Health Organization (WHO).[14] A dental mirror and a CPI probe were used, under natural light, with examiners and individuals seated.

Additionally to caries assessed by DMFT index, at the time of examination the need for dental treatment was evaluated according to the criteria proposed by WHO.

SiC Index was used to define caries severity in the third of the group presenting higher score of the disease.[1]

For statistical analysis the sample was divided into two groups: the first with one third of the individuals with greater caries indexes, SiC group (high caries experience) and the other with the remaining individuals with lower indexes (low caries experience).

Data from 2002 were typed into EpiInfo version 5.01, to perform statistical analysis. For results analysis, chi-square test and Mann-Whitney test were used, with a 5% significance level.

The study was approved by the Ethical Research Committee of the *Faculdade de Odontologia de Piracicaba* (School of Dental Medicine of Piracicaba; Process # 029/2003).

RESULTS

Among 12-year-old individuals, 20.0% were caries free in 1998, increasing to 32.9% in 2002 ($p<0.001$). For 18-year-olds, 6.8% and 5.4%, in the two years respectively, were caries free ($p=0.394$).

Mean DMFT indexes both for 12 and 18 year-olds in 2002 were significantly lower than those found in 1998 ($p<0.0001$). For 12 year-olds mean DMFT was 3.72, (SD=3.36) in 1998 and 2.52 in 2002, (SD=2.72). Difference in the period was 32.3%. For 18 year-olds, DMFT was 8.64 (SD=5.59) in 1998 and 7.13 (SD=4.39) in 2002, with a 17.5% decrease in caries experience.

Components of DMFT index for the two ages studied are in Figure 1. Decayed and filled teeth presented statistical difference ($p<0.05$) between the two periods for 12 year-olds, thus these adolescents presented more filled teeth and less decayed teeth in 2002. For 18 year-olds, all components presented differences between one year and the other ($p<0.05$), and the decayed component increased in 2002.

In Figure 2 it can be seen the comparison between mean DMFT in the general group, the values of the SiC index and the mean DMFT of the remaining 2/3 of the population with lower caries indexes. For both ages, values of DMFT, SiC, and DMFT of the 2/3 of adolescents with lower caries indexes were significantly smaller in 2002 than those found in 1998 ($p< 0.0001$).

Figure 3 shows that the percentage of decayed and missing teeth in the group with high caries experience was

[a] Secretaria de Estado da Saúde de São Paulo. Levantamento epidemiológico em saúde bucal: Estado de São Paulo, 1998. São Paulo;1999.
[b] Secretaria de Estado da Saúde de São Paulo. Projeto SB2000: Condições de saúde bucal no Estado de São Paulo em 2002. Relatório final. São Paulo; 2002. Disponível em: http://portal.saude.sp.gov.br/resources/gestor/destaques/saude_bucal/condicoes_de_saude_bucal,2002.pdf

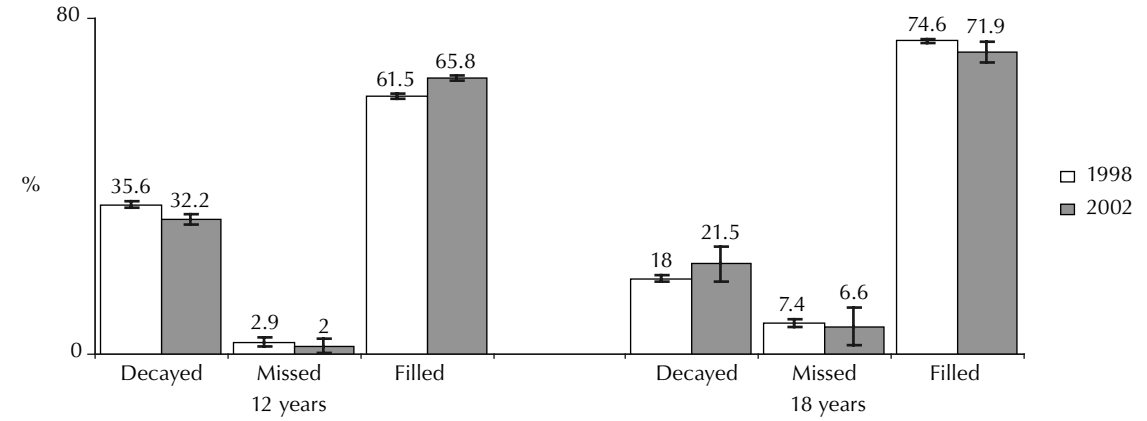


Figure 1. Percentage of decayed, missed and filled teeth and 95% CI according to age. State of São Paulo,1998 and 2002.

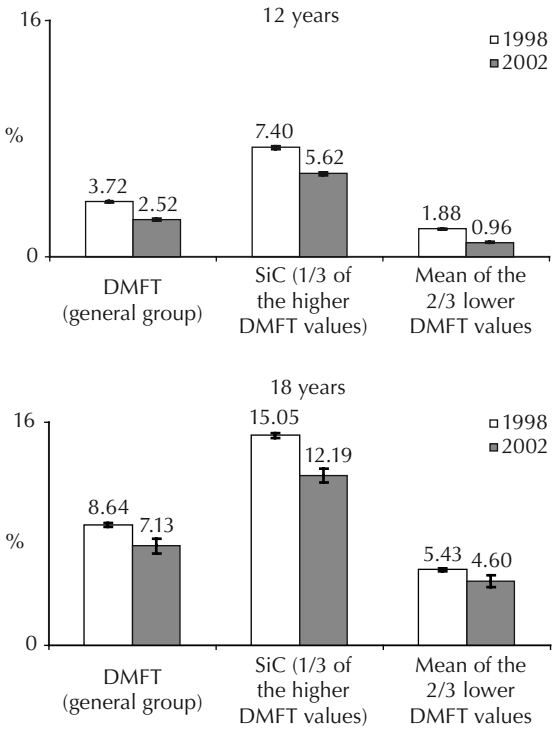


Figure 2. Comparison of DMFT index in the general group, in one third of the population with high severity (Sic Index) and the two thirds with low severity of dental caries according to age. State of São Paulo, 1998 and 2002.

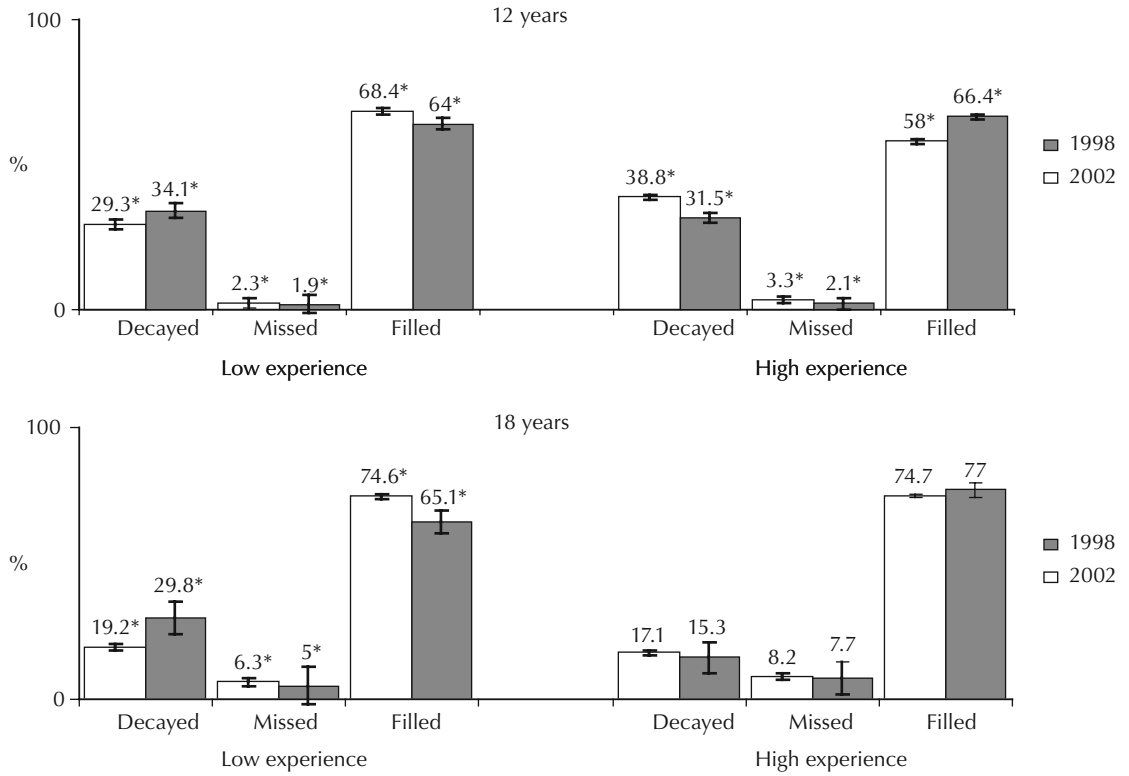
significantly lower in 2002 at 12 year-old ($p<0.0001$). There was no statistical difference between DMFT components for 18 year-olds who present high caries experience ($p>0.05$). In the group with low caries experience, the percentage of carious teeth was significantly higher in 2002, in both ages ($p<0.0001$).

On the Table, when comparing 1998 to 2002, it was observed that filling needs increased (of one and two or more surfaces) and the need for sealants decreased at 12 year-old. At 18, there was a decrease in the need for fillings (of one and two or more surfaces) and an increase in the need for sealants. In this Table, the sample was dichotomized in groups with low and high caries experience to compare treatment needs in each of these groups, in the two periods. At 12 year-old, the need for filling increased (of one and of two or more surfaces) and the need for exodontics decreased in the group with high caries experience. At 18, in this same group, there was an increase in the indication of crowns and veneers. In the group with low experience, at 12 year old, there was an increase in most treatments needed.

DISCUSSION

Sample procedures for 18 year-olds used in the oral health survey in 1998 were different from those performed in 2002. In spite of this, in both years the sample was considered representative of the State, although 18 year-olds from the present study were from a sample of adolescents 15 to 19 in 2002. The period of time of four years between examinations, even though is short, was enough to show differences in the caries experience for the ages studied.

During the last decades, a decrease in world prevalence of caries has been observed. Marthaler (2003) presents the decrease in caries indexes in several European countries in different ages and age groups.[5] In another study, from 1994 to 2000, a decrease in caries from 35.6% to 57.1% was observed in Germany.[11] This decrease has been also observed in the present study for the ages 12 and 18 years old, where there was a decrease in DMFT values at 12 year old around 32.3%, similar to that found in Araraquara, from 1989 to 1995.[3] In another study performed in a city (Bilac, Southeastern Brazil) without water fluoridation, a 50.4% decrease in DMFT index was observed at 12 year-old children from public schools,[6] greater than the one found in the present study.



* Numbers followed by star for the same variable between the years 1998 and 2002 are different at the 5% significance level by the chi-square test.

Figure 3. Comparison of components: decayed, missed and filled of DMFT (in percentage) between adolescents with low and high caries experience according to age. State of São Paulo, 1998 and 2002.

Table. Comparison of the treatment needs (in percentage) between 12 and 18 year-old adolescents with high and low caries experience. State of São Paulo,1998 and 2002.

Treatment need	General group			Low experience			High experience		
	1998	2002	p	1998	2002	p	1998	2002	p
12 Years-old									
Filling 1 surface	34.8*	46.3*	<0.001	21.9*	34.3*	<0.001	46.3	54.8*	<0.001
Filling 2 or + surfaces	14.8*	20.6*	<0.001	10.7*	18.4*	<0.001	18.4*	22.2*	<0.001
Occlusal sealants	37.6*	19.6*	<0.001	53.0*	31.7*	<0.001	23.8*	11.5*	<0.001
Exodontic	4.4*	4.2*	0.312	4.3*	5.3*	0.003	4.5*	3.4*	0.001
Pulpar + filling	3.6*	4.5*	<0.001	3.1*	5.0*	<0.001	4.2	4.2	0.942
Crown	0.3*	0.6*	0.005	0.2*	0.5*	0.017	0.5	0.7	0.117
Veneer	0.1	0.1	0.614	0.2	0.1	0.126	0.1	0.1	0.122
Remineralization	4.3	4.2	0.574	6.6*	4.8*	<0.001	2.3*	3.0*	<0.001
18 Years-old									
Filling 1 surface	58.4*	49.4*	<0.001	60.6*	48.3*	<0.001	56.5	51.3	0.156
Filling 2 or + surfaces	23.0*	18.8*	0.042	18.7	16.5	0.339	26.6	22.8	0.238
Occlusal sealants	4.3*	16.1*	<0.001	6.8*	22.7*	<0.001	2.0*	4.8*	0.011
Exodontic	5.9	7.1	0.966	5.9	6.5	<0.625	6.0	7.9	0.264
Pulpar + filling	6.0	5.9	0.944	5.5	4.7	0.533	6.5	7.9	0.428
Crown	1.3	1.8	0.353	1.2	0.9	0.677	1.4*	3.2*	0.044
Veneer	0.3*	1.0*	0.012	0.3	0.3	0.984	0.3*	2.1*	<0.001
Remineralization	0.8*	0*	0.038	1.1	0	0.062	0.6	0	0.265

* Numbers in the horizontal plane differ among themselves at the 5% significance by the chi-square test.

According to WHO data (2003), dental caries experience has been increasing in the last years in most developing countries, in developed countries caries experience has decreased in the last 20 years.[15] This same report brings data from countries with low dental caries prevalence at 12 years-old, that is, DMFT ranging from 1.2 to 2.6, some examples are Italy, the United States, Canada, England. In the present study, in the group with low dental caries experience, DMFT ranged from 1.88 to 0.96 (Figure 2), that is, about 50% decrease in the period studied. Regarding data from WHO, countries that presented mild dental caries (DMFT values from 2.7 to 4.4) have also been mentioned[15] (Russia, Eastern European countries, Mexico and Argentina), that are close to those observed in the present study for the general group. However, the group with high dental caries experience presented extremely high values (Figure 2), higher than those found in developing countries.

At 18 years old (Figure 1), great part of the DMFT index was made by the "filled" component in the two times of the study, just as at 12 years old. The "decayed" component increased only at 18 years old in 2002, showing a possible lack of access of this population to dental services.

Another aspect approached in the present study was the issue of the skewed distribution of the disease, which followed the decrease in caries (Figure 2), approached using SiC. Improvement in dental conditions in the ages surveyed was seen (Figure 2), both DMFT and SiC values decreased, this was also observed in the group with low caries experience. In individuals included in the 2/3 of the sample with lower DMFT values there was also decrease in caries experience, reinforcing the decrease in the skewed distribution in the period studied.

When the sample was dichotomized between people with low and high dental caries experience people (Figure 3), there were more people with decayed teeth in the 12-year-old group with low experience in 2002, for both age groups. In the group with high experience there were more people with filled teeth and less missing teeth in 2002, that is, although they presented high caries experience, these people received healing treatment more often.

The group with low dental caries experience presented an increase in carious teeth in both ages (Figure 2), with significant increase in most treatment needs in the 12-year-old group (Table). These results corroborate those of Rose, mentioned by Chor & Faerstein[2] (2000): several individuals exposed to low risk may lead to a greater number of cases than a few individuals exposed to a high risk of getting sick.

Based on the data of the present study, in addition to the maintenance of the positive results reached up to the present moment, there are still some needs to be met, especially low complex ones, such as fillings that involve only one surface (Table). Assessing the treatment needs observed in epidemiological surveys on oral health may differ from the behavior of dentists in their offices.[12] This is because one of the purposes of these surveys and the present work is to plan treatment of population groups, focusing on the epidemiological diagnoses of dental caries. There are concerning levels of activity and severity occurring before cavity stage, thus establishing the real need for treatment[12] that sometimes are not considered in epidemiological surveys in oral health. Still according to Rose, mentioned by Chor & Faerstein,[2] most biological parameters and medical conditions presented over a continuum, as the case of white spot lesions in pre-cavity stages, which have not been approached by the surveys described in the present study.

However, there are low cost preventive measures that can have a broad scope if adopted in population strategies such as incorporating fluoride in supplied water and developing models of oral attention, meeting the principles of universality, equality and integrality, with a more adequate oral health.

Population strategy decreases the incidence of the disease because all people are less exposed to causes and/or factors, even without interference in standards of individual susceptibility to the disease.[8] However, there are cases where non-individual measures are not enough and thus, geared preventive strategies are necessary such as, use of fluoride products, such as toothpaste, mouth rinses, gels for topic application among others, combined with education actions and adequate practices of oral hygiene will contribute to greater changes in the epidemiological picture of dental caries, especially in groups with higher risks.

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