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Dental caries and risk factors in adolescents of Ecatepec in the State of Mexico

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ABSTRACT

Objective. To identify the prevalence of dental caries and to evaluate the risk cariogenic factors in adolescents of the State of Mexico. **Material and methods.** An observational, descriptive and transversal study was conducted. The sample consisted of 109 teenagers, with ages ranging from 14 to 16 years old, 50 male and 59 female. Their teeth were evaluated using the DMFS index (decayed, lost and filled on the surface); the study was conducted by a WHO criteria standardized dentist researcher, with an intraexaminator Kappa value of 0.96. A survey was also conducted to establish the risk factors related to dental caries. **Results.** The DMFS results found were of 4.05 ± 3.47. In males the DMFS was of 3.50 ± 3.56 with the following distribution: DS 3.22 ± 3.54, MS 0.10 ± 0.58 y FS 0.18 ± 0.72, while with females the DMFS was of 4.51 ± 3.35, DS 3.86 ± 3.21, MS 0.15 ± 0.61 y FS 0.51 ± 1.19. Dental caries is related to the following variables: gender, frequency of toothbrushing, attendance to the dentist and intake of sugared products. **Conclusions.** It is recommended to continue with the health promotion programs, as well as with the use of fluoridated products, emphasizing tooth brushing and a decrease in the intake of sugared products.

Key words. Dental caries. Risk factors. Adolescents.

Caries dental y factores de riesgo en adolescentes de Ecatepec, Estado de México

RESUMEN

Objetivo. *Identificar la prevalencia de caries y evaluar los factores cariogénicos de riesgo de adolescentes del Estado de México.* ***Material y métodos.*** *Se realizó un estudio observacional, descriptivo y transversal. La muestra estuvo constituida por 109 adolescentes de 14 a 16 años de edad, 50 masculinos y 59 femeninos. Se evaluaron los órganos dentarios utilizando el índice CPOS (cariados, perdidos y obturados por superficie); el estudio fue realizado por un investigador estandarizado con los criterios de la OMS con un valor Kappa 0.96 intraexaminador. Se realizó además un cuestionario para establecer los factores de riesgo relacionados con caries dental.* ***Resultados.*** *Los resultados encontrados de CPOS fueron de 4.05 ± 3.47. En masculinos el CPOS fue de 3.50 ± 3.56 distribuyéndose CS 3.22 ± 3.54, PS 0.10 ± 0.58 y OS 0.18 ± 0.72, mientras que en mujeres el CPOS fue de 4.51 ± 3.35, CS 3.86 ± 3.21, PS 0.15 ± 0.61 y OS 0.51 ± 1.19. La caries está relacionada con las siguientes variables: género, frecuencia del cepillado dental, asistencia al dentista y consumo de productos azucarados.* ***Conclusiones.*** *Se recomienda continuar con programas de promoción para la salud y con el uso de productos fluorados, haciendo énfasis en el cepillado y en la disminución de la ingesta de productos azucarados.*

Palabras clave. *Caries dental. Factores de riesgo. Adolescentes.*

INTRODUCTION

The caries is a multifactor infectious disease characterized by localized and progressive demineralization of the inorganic portions of the tooth structure, as well as the ensuing deterioration of its organic component.[1] This destructive process has its origin in the micro organisms that are part of the dent bacterial plaque, as wells as in the enzymatic action that these perform over the fermentable carbohydrates, thus generating the production of lactic and piruvic acid, followed by the bacterial invasion

of the dental tubules. Besides the above mentioned factors, a cariose lesion requires a susceptible tooth and enough exposition time to allow the demineralization of the hard tissue of the teeth.[2,3]

Epidemiologically, the caries is a public health problem with a high degree of morbility and a high prevalence rate.

In developed countries, since the 1960s, a decrease in the prevalence of caries was observed. This improvement proves the efficacy of the control and prevention massive programs.[4-6]

In countries like Mexico, the caries affects about 95% of children below eight years of age and 99% of adults.[7] The high incidence of caries among Mexican children is owed to several factors, including the high intake of candy and junk food, auspiciated by a uncontrolled commercialization and publicity, and this is added to the society's lack of knowledge regarding the damage that is caused to the dental health, by consuming these foods between meals, without the proper oral hygiene.[8-11]

To prevent caries on a mass scale, the use of fluorided Salt was implemented some years ago in Mexico, this was first done in the State of Mexico and was followed by the rest of the Mexican Republic.[12,13] Besides these, other preventive programs are applied and include only a small percentage of the population. The poor communities are the most affected ones, and in addition to having socioeconomic problems, they lack any preventive and curative dental caries.[14]

Due to these massive programs like fluoridated salt and the exposition to multiple fluoridated products, in the last decade, several studies have been conducted, showing that there has been a decrease in the prevalence of dental caries,[15] these studies have been conducted in elementary school children, but only few studies adolescents population there have been conducted, that is why it was deemed important to conduct the present study.

The purpose of the present study was to determine the prevalence of dental caries and the cariogenic risk factors in adolescents residing in the county of Ecatepec in the State of Mexico.

MATERIAL AND METHODS

An observational, descriptive and transversal study was conducted in adolescents of both genders in Ecatepec County, in the State of Mexico. This area is characterized by a low socioeconomic level and big family cores, where construction workers, followed by service employees and petty tradesmen are to be found. The size of the sample was selected from 29 state public secondary schools of Ecatepec with similar characteristics of homogeneity in relation to formal, socioeconomic and cultural development. From these schools were taken at random two schools: the preparatory official CETIS 48 and 119. The sample size was calculated through a pilot study in which it was stated that 93% of these adolescents were aged between 14 and 16 years. The error was considered for the calculation of 5%. The sample was 103 subjects and was calculated for a confidence level of 95% with a standard deviation that was obtained from a previously conducted study.[16] The adolescents were selected by means of systematic random sampling taking 54 students from a school and 55 of another school. 109 adolescents consented and accepted to be part of the study were included.

A survey was conducted to obtain their socioeconomic data and some questions were posed, regarding the frequency and the beginning of their toothbrush, their use of dental toothpastes, their attendance to the dentist, their intake of sugared products, and the level of education of their parents. In a pilot study with 41 adolescents was calculated the consistency[17,18] of items within a test with the Cronbach Coefficient Alpha producing values higher than 0.7 for the survey questions. The Intra-Class Correlation Coefficient was used to estimate the temporary stability of the answers obtained values higher 70% and inter-observer concordance was quantified for each item obtained values greater than 0.7.

The oral cavity was evaluated through physical exploration, assessing the status of the dental organs with an explorer and a flat dental mirror in broad daylight. The obtained data were registered in the questionnaire as well as in an odontogram. Third molars were not included in this study due to the fact that in this particular age group, third molars are still not present.

The dental examination was done by a standardized dentist according to the WHO criteria,[19] having obtained an intraexaminer Kappa value of 0.96 by means of a recodification of the variable of the number of surfaces being 0   no error in the observation and 1   error in observation.

To establish the prevalence and severity of the caries in the permanent dentition the epidemiologic index DMFS (decayed, missed and filled surfaces) was used, considering that the index of dental caries per surface presents a higher sensitivity.[18]

With the information of the questionnaire and the registered examination in the odontogram, an initial

data base was done using Microsoft Excel and it was later processed with the statistical SPSS 11.0 and STATGRAPHICS Plus 5.0, having obtained descriptive statistics: frequencies, percentages, averages and standard deviations. A logistical regression analysis was performed, including the following variables in the model: gender, initial age of toothbrushing, frequency of toothbrushing, attendance to the dentist, and intake of sugared products; Hosmer and Lemeshow[20,21] and Wald[22] tests were also performed, including the corresponding p values, in order to evaluate the statistical significance of the logistic regression model. An analysis of the variables was also performed by means of the odd ratios (OR) with their respective confidence intervals (95% CI) calculation, with the aim of determining the behaviour of the risk factors of dental caries.

RESULTS

A total of 109 adolescents, aging 14 to 16 years old, with a mean of 14.61 ± 0.65, were studied. The 45.9% (50) were male and the 54.1% (59) female (Table 1).

The prevalence of dental caries was of 79.8% and DMFS index was of 4.05 ± 3.47, with the following distribution: DS 3.57 ± 3.37, MS 0.13 ± 0.60, FS 0.36 ± 1.01.

In the masculine gender the DMFS was of 3.50 ± 3.56, with the following distribution; DS 3.22 ± 3.54, MS 0.10 ± 0.58 and FS 0.18 ± 0.72, while the feminine gender showed DMFS of 4.51 ± 3.35, with the following distribution: DS 3.86 ± 3.21, MS 0.15 ± 0.61 and FS 0.51 ± 1.19. The feminine gender showed a higher index of decayed surfaces and a higher index of filled teeth than the masculine gender (Table 1).

In table 1, the indexes for the variables are also shown: gender, initial age of toothbrushing, frequency of toothbrushing, attendance to the dentist, intake of sugared products and the level of education of parents.

Table 2 shows the logistic regression that indicates that caries is related to the following variables: gender, frequency of toothbrushing per day, attendance to the dentist and intake of sugared products. For these significant variables, the percentages of the caries prevalence were obtained. In this table, the Odds Ratio, as well as the 95% confidence intervals for these variables are also shown.

The female gender presented a higher index of decayed surfaces and a higher number of filled teeth, in contrast to the male gender.

Caries in females were of 85% (95%CI: 73-93) while males registered a 74% (95%CI: 60-85). Wo-

Table 1. Mean ± ds of DMFS for gender, initial age and frequency of toothbrushing, attendance to the dentist, intake of sugared products and level of education of the parents.

	Num.	DS	MS	FS	DMFS
Totals	109	3.57 ± 3.37	0.13 ± 0.60	0.36 ± 1.01	4.05 ± 3.47
Gender:					
Male	50	3.22 ± 3.54	0.10 ± 0.58	0.18 ± 0.72	3.50 ± 3.56
Female	59	3.86 ± 3.21	0.15 ± 0.61	0.51 ± 1.19	4.51 ± 3.35
Initial age of toothbrushing:					
Before three	41	3.44 ± 3.41	0.097 ± 0.49	0.27 ± 0.81	3.80 ± 3.41
After three	68	3.65 ± 3.36	0.15 ± 0.65	0.41 ± 1.12	4.19 ± 3.52
Frequency of toothbrushing:					
Once	16	4.56 ± 3.76	0.25 ± 1.00	0.44 ± 1.50	5.25 ± 3.42
Twice	59	3.63 ± 3.28	0.05 ± 0.29	0.31 ± 0.88	3.98 ± 3.44
Three or more times	34	3.00 ± 3.30	0.21 ± 0.73	0.41 ± 0.99	3.59 ± 3.52
Attendance to the dentist:					
No	26	3.35 ± 3.54	0.00 ± 0.00	0.12 ± 0.59	3.46 ± 3.48
Yes	83	3.64 ± 3.33	0.17 ± 0.68	0.43 ± 1.11	4.23 ± 3.47
Intake of sugared products:					
No	5	3.20 ± 5.22	0.00 ± 0.00	0.00 ± 0.00	3.20 ± 5.22
Yes	104	$3.59 + 3.29$	$0.13 + 0.61$	0.38 ± 1.04	4.09 ± 3.39
Level of education of parents:					
Elementary school	37	4.35 ± 3.54	0.11 ± 0.52	0.41 ± 1.14	4.84 ± 3.62
Beyond elementary	72	3.17 ± 3.22	0.14 ± 0.63	0.33 ± 0.95	3.64 ± 3.34

DS: Standard deviations.

Table 2. Logistic regression for dental caries (DMFS = 0 and DMFS > 0) with significant independent variables.

	n (%)	DMFS = 0 n (%)	DMFS > 0 n (%)	OR	p-value	95% CI
Gender:						
Male	50 (45.9)	13 (26)	37 (74)	0.28	0.029	0.09 - 0.876
Female	59 (54.1)	9 (15)	50 (85)	–	–	–
Initial age of toothbrushing:						
Before three	41 (37.6)	5 (12)	36 (88)	3.18	0.070	0.91 - 11.08
After three	68 (62.4)	17 (25)	51 (75)	–	–	–
Frequency of toothbrushing					0.049	
Once	16 (14.7)	1 (6)	15 (94)	16.48	0.028	1.35 - 200.9
Twice	59 (54.1)	13 (22)	46 (78)	3.37	0.059	0.95 - 11.86
3 times	34 (31.2)	8 (24)	26 (76)	–	–	–
Attendance to the dentist:						
No	26 (23.9)	9 (35)	17 (65)	0.21	0.013	0.062 - 0.72
Yes	83 (76.1)	13 (16)	70 (84)	–	–	–
Intake of sugared products:						
No	5 (4.6)	3 (60)	2 (40)	0.075	0.027	0.008 - 0.75
Yes	104 (95.4)	19 (18)	85 (82)	–	–	–

Adjusted odds ratio OR by variables in table, 95% confidence intervals, estimated with robust standard errors. Hosmer Lemeshow: chi-square (8) = 4.91; p = 0.7669. Specification error test (linktest), predictor p = 0.000; predictor^2 p = 0.818.

men present 3.57 times more possibility of having decay than men.

In relation to initial tooth brushing age variable, the table 1 show that those who started tooth brushing before 3 years of age, presented a lesser caries experience than those who did so later onwards.

All adolescents use a tooth paste with fluoride for their oral hygiene. Those who only tooth brush once a day had 94% of caries, while those who toothbrush two or three times a day presented only 78% and 76% respectively. Only 31.2% manifested brushing three times a day. Those who only tooth brush once a day (14.7%) have 16.5 times more possibility of caries prevalence in contrast to those who toothbrushing more often. Nevertheless, in logistic regression show significance in frequency of toohbrushing excluding twice a day case.

Eighty three adolescents have attended the dentist, from which 84% has or has had an experience with caries, among those that had never been attended; only 65% have a record for caries.

With regard to the intake of sugared products, the studied population consumes it mainly in the form of carbonated drinks, pastries and fried potatoes, and 82% of these, presented caries (95%CI: 73-89), only 5% denied consuming junk food and out of these, only three of them were free of dental decay. The adolescents that do not consume sugary foods have 13.3 less risk of caries, as compared to those that do.

A higher schooling in the family was associated with lesser decayed surfaces, the children of parents who only had primary schooling, present 86% of decayed surfaces and those with a higher schooling only 76%. In our case, in the final model of logistic regression there was no association between the schooling of the parents and the dental caries.

DISCUSSION

The prevalence of dental caries found in the studied adolescents was of 79.8%. The caries component was predominant; meanwhile filled surfaces showed a lower value; a similar situation was found in several studies nation-wide,[23,24] and also in Latin American countries,[25] which reflects poor dental care services in these nations and a lack of dental health education. An exception was found in Brazil,[26] where the filled component was higher due to a good dental attention promoted by the Health Ministry.

Risk factors were higher among the female gender; the present study matches several works,[24,26] but it's because women's dental eruption begins six months earlier than males, so they are exposed to cariogenic factors beforehand.[27] Women present more treated surfaces than men, with similar results in several studies in Mexico[24,28] as well, because they are in general more interested in their personal appearance.[29]

Regarding toothbrushing, our study is related to those[30,31] which showed that people who had acquired this habit, presented a lower risk to caries, because they removed dental-plaque[32] effectively. Similar results were found in Oaxacan adolescents.[33]

On the other hand, since two decades ago, all tooth pastes in the Mexican Republic contain fluoride, so it helps as a preventive caries control method. In industrialized countries, caries prevention is based on the use of dentifrices[34,35] and also in these places, people are educated to have periodical check up of their dental health;[36,37] this situation is not found in other countries where people only visit the dentist in case of a toothache. It was clear from this study that there are few treated surfaces, due to poor social public services and also adolescent populations in similar countries as ours, visit the dentist very seldom and this is also related to the rebellious behavior of this age.[38]

This situation is also influenced by the costs of treatments, performed by private dentist, because in some regions lacks of socioeconomic resources are to be found.

Young people consume great quantities of industrialized carbohydrates, generally due to the enormous publicity in the media, so in addition to the other factors pointed out, this would be another one that matches the reported studies.[39-41] These kinds of sugars on the diet mean the base-line for the oral microflora formation.

In this study the level of education of the parents, who live with the adolescent, did not constitute an important factor in the prevalence and risk of dental caries in the final model; this result is not compatible with other studies[42] in which the parent's education and especially mother's education plays an important role, because a higher schooling improves the attention to health, including dental health. Parent's education is important because it is related to a positive attitude towards oral-health, and seeking out of odontological preventive services.

The present study presents some limitations, among them we can name the transversal model; the ideal way is to make a longitudinal study to establish the specific value through time on the risk factors.

The use of a questionnaire in transversal studies may cause a temporal ambiguity problem, for a memory bias may be present among people inquired, and the reported association may not represent the reality of some variables such as initial age of toothbrushing, which may present a limitation on the elapsed time. Nevertheless, we need to make clear that transversal studies, and questionnaires are employed by a great number of authors in similar epidemiological works such as this one, so we consider we should take into account these aspects in the planning of future studies.

CONCLUSIONS

We can conclude in base of the obtained results, that not treated dental caries prevalence in adolescents is high. Significant risk factors related to predict caries were gender, hygienic habits associating to frequency of dental brushing, attendance to the dentist and sugar products consumed.

It is necessary to pointed out that there is a great need for dental and oral health among adolescent population so it is of high relevance to include preventive strategies with a major public services compromise, to give attention to sick teeth and look for the implementation of preventive programs in toddles, children and adolescents, remarking on hygienic and dietary habits and also the employ of remineralizing substances.

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REFERENCES

1. Romero BJ, Juárez LM. Prevalencia y factores de riesgo de la caries dental. *Med Oral* 2006; 8: 163 7.
2. Campos CE. Etiología de la caries, estreptococo mutans, capacidad buffer salival y tipo de dieta. *Rev ADM* 1985; 42: 43 50.
3. Szpunar SM, Eklund SA, Burt BA. Sugar consumption and caries risk in schoolchildren with low caries experience. *Community Dent Oral Epidemiol* 1995; 23: 142 6.
4. Marthaler TM. Changes in dental caries. 1953 2003 *Caries Res* 2004; 38: 173 81.
5. Tala H. Dental caries of children, their parent's social status and knowledge of the prevention of the disease. *Proc Finn Dent Soc* 1984; 80: 204 47.
6. Nourjah P, Horowitz AM, Wagener DK. Factors associated with the use of fluoride supplements and fluoride dentifrice by infants and toddlers. *J Public Health Dent* 1994; 54: 47 54.
7. Jensen K, Hermosillo JG. Salud dental: problemas de caries dental, higiene bucal y gingivitis en la población de México. *Bol Oficina Sanit Panam* 1983; 94: 587 603.

8. Vega FL, Iñarritu MC. Adicción a los alimentos "chatarra" en niños y adultos. *Rev Mex Pediatr* 2002; 69: 219 20.

9. Jusidman C, Moreno AA. Los productos chatarras y su incorporación en el medio rural. *Revista del Consumidor* 1988; 119 21.

10. Maupomé Carvantes G, Sánchez Reyes V, Laguna Ortega S, Andrade Delgado L, Diez de Bonilla Calderón J. Patrón de consumo de refrescos en una población mexicana. *Salud Publ Mex* 1995; 37: 323 8.

11. Ismail AI, Tanzer JM, Dingle JL. Current trends of sugar consumption in developing societies. *Community Dent Oral Epidemiol* 1997; 25: 438 43.

12. Estudio epidemiológico de caries dental en la población infantil del Estado de México. Programa de prevención de caries dental mediante el consumo de sal de mesa fluorurada. Subprograma de Vigilancia Epidemiológica. Instituto de Salud del Estado de México. Julio; 1990.

13. Norma Oficial Mexicana NOM 040 SSA1 1993 Bienes y Servicios. Sal iodatada. Sal fluorada. Requisitos Sanitarios. Diario Oficial de la Federación. México 23 de marzo 1995.

14. Molina Frechero N, Irigoyen ME, Castañeda CR, Sánchez HG, Bologna R. Caries dental en escolares de distinto nivel socioeconómico *Rev Mex Pediatr* 2002; 69: 53 6.

15. Velázquez MO, Vera HH, Irigoyen CM, Mejía GA, Sánchez PTL. Cambios en la prevalencia de la caries dental en escolares de tres regiones de México: encuestas de 1987 1988 y de 1997 1998. *Rev Panam Salud Pública* 2003; 13: 320 6.

16. Molina N, Mendoza P, Bologna R, Luna G. Dental caries status of 15 year old students in Mexico. *Community Dent Health* 1999; 16: 200. [Abstract].

17. Lerchen ML, Samet JM. An assessment of the validity of questionnaire responses provided by a surviving spouse. *Am J Epidemiol* 1986; 123: 481 9.

18. Arribas M. Diseño y validación de cuestionarios. *Matr Prof* 2004; 5: 23 9.

19. World Health Organization. Oral Health Surveys. Basic methods. Geneve WHO; 1997.

20. Hosmer DW, Lemeshow S. Applied logistic regression. 2nd Ed. New York USA: John Wiley& Sons Interscience Publication; 2000.

21. Bagley SC, While H, Golomb BA. Logistic regression in the medical literature: Standards for use and reporting, with particular attention to one medical domain. *J Clin Epidemiol* 2001; 54: 979 85.

22. Hauck WW, Donner A. Wald's test as applied to hypothesis in logia analysis. *JASA* 1977; 72: 851 3.

23. Molina FN, Hernández GJC, Castañeda CRE, Mendoza RP. Prevalencia de caries dental y necesidad de tratamiento. *Dentista y Paciente* 2002; 10: 22 5.

24. Ortega Maldonado M, Mota Sanhua V, López Vivanco JC. Estado de Salud Bucal en Adolescentes de la Ciudad de México. *Rev Salud Pública (Colombia)* 2007; 9: 380 7.

25. Solórzano I, Salas MT, Chavarría P. Prevalence and severity of dental caries in Costa Rican schoolchildren: results of the 1999 National Survey. *Int Dent J* 2005; 55: 24 30.

26. Gushi LL, Soares MC, Bighetti Forni TI, Seichi Wada R, de Sousa MLR. Cárie dentária em adolescentes de 15 a 19 anos de idade no Estado de Sao Paulo, Brasil, 2002. *Cad Saúde Pública* 2005; 21: 1383 9.

27. Rodríguez Vilchis LE, Contreras Bulnes R, Arjona Serrano J, Soto Mendieta MR, Alanís Tavira J. Prevalencia de caries y conocimientos sobre salud enfermedad bucal de niños (3 a 12 años) en el Estado de México. *Rev ADM* 2006; 63: 170 5.

28. Mendoza Roaf PL, Pozos Radillo BE. Estado de salud buco dental en escolares de Guadalajara. *Pract Odontol* 1995; 16: 35 41.

29. Soria Hernández MA, Molina Frechero N, Rodríguez PR. Hábitos de higiene bucal y su influencia sobre la frecuencia de caries dental. *Acta Pediatr Mex* 2008; 29: 21 4.

30. Unkel J, Fenton SK,Hobbs G, Frere C. Tooth brushing ability related age. *J Dent Child* 1995; 5: 346 8.

31. Moreno Altamirano A, Carréon García J, Alvear Galindo G, López Moreno S, Vega Franco L. Riesgo de caries en escolares de escuelas oficiales de la ciudad de México. *Rev Mex Pediatr* 2001; 68: 228 33.

32. Microbiologic aspects of dental plaque and dental caries *Dent Clin North Am* 1999; 43: 599 614.

33. Rivera Hermosillo G, Martínez Torres J, Hernández Laguna E. Caries dental e higiene bucal en adolescentes. *Revista ADM* 2006; 63: 231 4.

34. Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestäl C, Lagerlöf F, et al. Caries preventive effect of fluoride toothpaste: a systematic review. *Acta Odontol Scand* 2003; 6: 347 55.

35. Köning KG. Clinical Manifestations and treatment of Caries from 1953 to Global Changes in the 20th Century. *Caries Res* 2004; 38: 168 72.

36. Medina Solis CE, Maupomé G, Avila Burgos L, Hijar Medina M, Segovia Villanueva A, Pérez Nuñez R. Factors influencing the use of dental health services by preschool children in Mexico. *Pediatr Dent* 2006; 28: 285 92.

37. de la Fuente Hernandez J, Acosta Gio E. The effect of poverty on access to oral health care. *JADA* 2007; 138: 1443 4.

38. Carosella M, Milgram L, Della Rica M, Ayuso MS, Fainboim V, Llorens A, Hiebra MC. Análisis del estado de salud bucal de una población adolescente. *Arch Argent Pediatr* 2003; 101: 454 9.

39. Arnadottir IB, Rozier RG, Saemundsson SR, Sigurjons H, Holbrook WP. Approximal caries and sugar consumption in Icelandic teenagers. *Community Dent Oral Epidemiol* 1998; 26: 115 21.

40. Kashket S, Zhang J, van Houte J. Accumulation of fermentable sugars and metabolic acids in food particles that become entrapped on the dentition. *J Dent Res* 1996; 11: 1885 91.

41. Molina Frechero N, Castañeda CE, Gaona E, Mendoza RP, González MT. Consumo de productos azucarados y caries dental en escolares. *Rev Mex Pediatr* 2004; 27: 14 8.

42. Mendoza Sassi R, Beria JU. Utilización de los servicios de salud: una revisión sobre los factores relacionados. *Cad Saúde Pública* 2001; 17: 819 32.

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