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Dental caries in young male adults: prevalence, severity and associated factors

Cárie dentária em homens jovens: prevalência, severidade e fatores associados

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ABSTRACT: The aim of the present study was to determine the prevalence and severity of dental caries as well as the needs for dental treatment in 18-year-old males from Maringá, PR, Brazil. The association of dental caries experience with socioeconomic variables was also tested. A cross sectional study was conducted in a random sample of 241 conscripts of the Brazilian Army. The adopted diagnosis criteria were those proposed by the World Health Organization. A socioeconomic questionnaire was utilized to determine family income and the criterion of the Brazil Economic Classification of the National Association of Research Enterprises. Associations among caries prevalence, DMF-T index, treatment needs and socioeconomic variables were evaluated by means of the Chi-Square, Mann-Whitney and Kruskal-Wallis tests. Caries prevalence was 82.6% and the mean DMF-T index was 4.6. Only a mean of 0.8 tooth per individual presented treatment needs. Significant statistical differences were found in caries prevalence and severity (DMF-T). The worst results were observed in the groups of lower income and purchasing power, indicating a need for the implementation of social policies that address these populations aiming at diminishing the existing differences in the health-disease process indicators. On the other hand, treatment needs were only associated to the Brazil Economic Classification Criterion variable ($p < 0.05$).

DESCRIPTORS: Dental caries; Epidemiology; DMF index; Social conditions.

RESUMO: O objetivo do presente estudo foi conhecer a prevalência e a severidade da cárie dentária, bem como as necessidades de tratamento odontológico de jovens de 18 anos de idade do sexo masculino em Maringá, Paraná, Brasil. A associação da experiência de cárie com variáveis socioeconômicas também foi testada. Foi realizado um estudo transversal em uma amostra aleatória de conscritos (n = 241) do Exército Brasileiro. Os critérios de diagnóstico adotados foram aqueles estabelecidos pela Organização Mundial de Saúde. Foram utilizados um questionário socioeconômico para aferir a renda familiar e o Critério de Classificação Econômica Brasil da Associação Nacional de Empresas de Pesquisa. Associações entre a prevalência de cárie, o índice CPO-D, a necessidade de tratamento e as variáveis socioeconômicas foram avaliadas por meio dos testes Qui-quadrado, Mann-Whitney e Kruskal-Wallis. A prevalência de cárie foi de 82,6% e o índice CPO-D médio foi igual a 4,6. Apenas 0,8 dente por indivíduo, em média, apresentou-se com necessidade de tratamento. Diferenças estatisticamente significativas foram encontradas na prevalência e na severidade de cárie (CPO-D), sendo os piores indicadores verificados nos grupos de baixa renda e baixo poder aquisitivo, indicando a necessidade de implantação de políticas sociais que contemplem essas populações, com o intuito de diminuir o diferencial nos indicadores do processo saúde-doença. Por outro lado, as necessidades de tratamento associaram-se somente à variável Critério de Classificação Econômica Brasil ($p < 0,05$).

DESCRITORES: Cárie dentária; Epidemiologia; Índice CPO; Condições sociais.

INTRODUCTION

Epidemiology in oral health has progressed extensively in the last years in Brazil, specially from the point of view of data assessment at the municipal level. The advent of the Unified Health System ("Sistema Único de Saúde") in the late 80's introduced a new challenge to the managers of public oral health care systems because it created the need for new epidemiological models, this fact becoming a catalytic factor for initiatives that generate information about oral health[14].

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It stands out that, in Brazil, epidemiological studies related to dental caries in young adults are scarce. Besides, there are no Brazilian studies concerning individuals that reach adult age caries-free[13]. The few studies that can be found in a review of the dental literature were conducted almost exclusively in developed and industrialized countries[4,10,15].

Considering this situation, the present study aimed to contribute to the oral health programs carried out in the city of Maringá, PR, Brazil, with the purpose of determining dental caries prevalence and severity, as well as dental treatment needs in 18-year-old males. Furthermore, it aimed at verifying the association of those factors with the socioeconomic conditions of the studied population in order to establish practices that can address collective oral health issues, allowing access to all and guaranteeing equity in addressing the population's needs.

MATERIALS AND METHODS

According to Minayo, Sanches[11] (1993), the choice of methodology must be based both on the nature of the problem to be studied and on the reality to be focused. To reach the proposed objectives, a cross-sectional study was conducted on dental caries and treatment needs.

The studied population consisted of conscripts of the Brazilian Army from Maringá in 2003, corresponding to 2,700 youths that were enlisted for examination and for the process of military enrolling. In order to render the study uniform, those conscripts not residing in Maringá and those above the age of 18 were excluded. The survey was conducted at the municipal Recruitment Center ("Tiro-de-Guerra"), and was carried out concomitantly with the military selection process, according to previous contacts with the respective authorities, in such a manner not to alter their routine and not to impair the development of their activities.

An essential factor in any research of this nature refers to the sample to be studied. Besides the need of studying a sample that represents a population properly and that can be acquired by means of an adequate planning, the number of individuals to be examined is paramount for the validity of the conclusions. According to Fleiss[8] (1981), for the attainment of a minimal sample of 237 youths, an 81% prevalence, an estimated error of 5% and a confidence level of 95% were considered. The prevalence value utilized for the calculation was the one related to dental caries in 18-year-old youths from Florianópolis, SC, Brazil[9].

During the twenty days assigned for the Army routine medical examinations, ten days were chosen randomly for the realization of this research.

Because dental caries and treatment needs of the population were to be estimated, a sample larger than statistically required was selected. Thirteen individuals were incorporated to the study, taking into consideration possible losses, thus totalizing 250 individuals. Each day, 25 youths were chosen through a simple casual sampling process.

A questionnaire was applied for the collection of socioeconomic data, and a form was filled out for the collection of clinical data. The socioeconomic findings were obtained by means of a questionnaire that included family income in local currency ("real" - R$). That income was afterwards converted to a number of minimum wages-MW (1 MW = R$240.00 or US$82.75, according to the exchange rate at the time of the study).

In this study, an option was also made to collect information that would allow to classify families according to the Brazil Economic Classification Criterion (BECC) of the National Association of Research Enterprises[3].

For the clinical data, examinations of the dental conditions and treatment needs, the codes and criteria of the classification recommended by the World Health Organization (WHO) in its 4th version of the Oral Health Surveys, Basic Methods, were used[16].

The research team was composed of an examiner (the first author) and two dental undergraduate students responsible for filling out forms and files, one taking care of the socioeconomic questionnaire, and the other, the clinical examination.

Before data collection, a pilot study with 25 youths of the same age, not included in the study sample, was carried out, including a pre-test questionnaire and examiner calibration.

A free-will and informed consent term was required from each one of the youths to be examined. If, during the examination, a potentially fatal condition or one that demanded immediate care was identified, the case was referred to a pertinent public oral health center. The present study was submitted to the Ethics in Research Committee, Londrina State University, and received a favorable judgment.

Examinations were performed in a spacious environment, with sufficient natural light, complemented, when necessary, by a portable flashlamp. The individuals to be examined remained seated and the examiner stood. The examiners were properly and professionally vested with mask, cap, glasses and gloves (the latter were changed at each examination) and made use of periodontal probes (CPI Probe) and flat dental mirrors, previously sterilized. All the biosafety norms were followed.

Examinations were performed in duplicates in 10% of the sample (25 youths). The Kappa statistical method was utilized to calculate reproductibility, considering the tooth as the diagnosis unity, in agreement with the methodology described by Peres *et al.*[12] (2001). The subsequent examinations had the purpose of checking the reliability of the initial examination diagnosis. Data collection and statistical analysis were accomplished with the aid of the EPI INFO 6.04 program[7].

To test the differences between populations and differences in the DMF-T index related to socioeconomic variables, with the exception of the BECC, the Chi-square and the Mann-Whitney tests were employed, respectively. For the BECC analysis with the variables of interest, Pearson's Chi-square and the Kruskal-Wallis tests were used, due to the stratification in more than two categories. The choice of non-parametric tests is justifiable, since the caries index utilized (DMF-T) does not present a normal distribution. A 5% level of statistical significance was adopted.

RESULTS

The final sample totalized 241 individuals, since 9 youths (3.6%) refused to participate in the study or were excluded. The intra-examiner diagnostic consistency, both for dental conditions and for dental treatment needs, estimated tooth by tooth, was high, the lowest value being 0.76 (Kappa test = 0.76).

Caries prevalence was 82.6% and the mean DMF-T index, 4.6. The caries-free population was composed of 42 individuals (17.4%) with no carious lesions, dental losses due to caries or restorations. The filled teeth mean was 3.7, which corresponds to 80.5% of the index. Observation of the descriptions of the DMF-T index and its components according to quartiles indicated that the index distribution was not normal (Table 1).

Caries prevalence and the DMF-T index were compared to the socioeconomic variables in two different ways. First, caries occurrence was studied, and was considered to be either absent (DMF-T = 0) or present (DMF-T ≥ 1). Statistical analysis showed a significant association with the two socioeconomic variables studied. The higher the family income the lower the caries onset prevalence ($p < 0.05$). Youths presenting higher caries prevalence belonged to families with a reduced purchasing power as estimated by the BECC (Table 2).

The second way of analysis was to test the severity of caries onset, as measured by the DMF-T index, in relation to the socioeconomic variables by means of the Mann-Whitney and Kruskal-Wallis tests. Again, there was a statistically significant difference among DMF-T index, family income and BECC values. The highest DMF-T index and the maximum individual value were observed in conscripts belonging to the socioeconomic classes D and E, i.e., those with the lowest purchasing power (Table 3).

Dental treatment needs were found in 35.7% of the studied population. Nevertheless, only an

TABLE 1 - Distribution of the decayed, lost and filled components of the DMF-T index and the number of teeth present in 18-year-old males (n = 241) from Maringá, PR, Brazil, 2003.

Statistics	Decayed	Missed	Filled	DMF-T	DMF-T zero	Teeth present
Mean	0.7	0.2	3.7	4.6	-	28.9
Standard deviation	1.2	0.5	4.0	4.3	-	1.6
%	15.2	4.3	80.5	100.0	17.4	-
Minimum	0.0	0.0	0.0	0.0	-	24.0
Quartile 25%	0.0	0.0	0.0	1.0	-	28.0
Median	0.0	0.0	3.0	4.0	-	28.0
Quartile 75%	1.0	0.0	5.0	7.0	-	30.0
Maximum	6.0	4.0	20.0	22.0	-	32.0

TABLE 2 - Association between caries prevalence (DMF-T) and socioeconomic variables in 18-year-old males (n = 241) from Maringá, PR, Brazil, 2003.

Variables		DMF-T				χ^2	p value
		0		≥ 1			
		N	%	n	%		
Family income	< 5 MW[1]	15	10.8	124	89.2	8.99[Y]	0.003
	≥ 5 MW[1]	27	26.5	75	73.5		
BECC[2]	A	10	34.5	19	65.5	9.06[P]	0.028
	B	12	21.4	44	78.6		
	C	15	13.9	93	86.1		
	D+E	5	10.4	43	89.6		

[Y]Chi-square test with Yates's correction; [P]Pearson's Chi-square test.[1]Minimum Wage. [2]Brazil Economic Classification Criterion.

TABLE 3 - DMF-T index according to socioeconomic variables in 18-year-olds enrolled in the Brazilian Army (n = 241) in Maringá, PR, Brazil, 2003.

Variables		N	$\bar{\chi}$	DP	Minimum	Q_1	Median	Q_3	Maximum
Family income*	< 5 MW[1]	139	5.2	4.4	0.0	2.0	4.0	8.0	22.0
	≥ 5 MW[1]	102	3.7	3.9	0.0	0.0	3.0	6.0	21.0
BECC[2]**	A	29	3.5	3.6	0.0	0.0	3.0	5.0	13.0
	B	56	4.3	3.8	0.0	1.0	4.0	6.5	20.0
	C	108	4.2	4.0	0.0	1.0	3.0	6.0	21.0
	D+E	48	6.3	5.2	0.0	3.0	5.5	10.0	22.0

[1]Minimum Wage. [2]Brazil Economic Classification Criterion. *p < 0.01 value (Mann-Whitney test); **p < 0.05 value (Kruskal-Wallis test).

TABLE 4 - Dental treatment needs in 18-year-old males (n = 241). Means (in teeth) per individual, standard deviation (SD), percentages and sum. Maringá, PR, Brazil, 2003.

Statistics	Restoration (one surface)	Restoration (two surfaces or more)	Exodontia	Endodontics + Restoration	Total
Mean	0.4	0.2	0.1	0.1	0.8
SD	0.8	0.5	0.3	0.3	1.2
%	52.9	26.2	7.5	13.4	100.0
Sum	91	45	13	23	172

average 0.8 tooth needed treatment. There was no diagnosis of the necessity of treatment with veneers or prosthetic crowns. Simple restorations corresponded to 79.1% of the total needs (Table 4).

The mean number and standard deviation of teeth with treatment needs by parameters are presented in Table 5 (family income and BECC). The BECC presented by the National Association of Research Enterprises proved to be more indicated for the associations, since the statistic analysis demonstrated a significant association between some of the treatment needs and the socioeconomic classes studied ($p < 0.05$), whereas the association between treatment needs and family income was not statistically significant. In the same way as previously shown, some dental treatment needs found in classes D and E were four times greater than the values for class A (Table 5).

TABLE 5 - Index of dental treatment needs according to socioeconomic variables in 18-year-old males (n = 241) from Maringá, PR, Brazil, 2003.

Variables		Restoration (one surface)	Restoration (two or more surfaces)	Exodontia	Endodontics + Restoration
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Family income*		p = 0.21 (NS)	p = 0.66 (NS)	p = 0.22 (NS)	p = 0.25 (NS)
	< 5 MW[1]	0.44 (0.82)	0.17(0.49)	0.07 (0.35)	0.11 (0.36)
	≥ 5 MW[1]	0.29 (0.67)	0.21(0.53)	0.03 (0.22)	0.07 (0.29)
BECC[2]**		p = 0.03	p = 0.44 (NS)	p = 0.21 (NS)	p = 0.03
	A	0.14 (0.35)	0.10 (0.41)	0.00 (0.00)	0.03 (0.19)
	B	0.45 (0.61)	0.23 (0.57)	0.04 (0.27)	0.05 (0.23)
	C	0.30 (0.67)	0.16 (0.48)	0.05 (0.25)	0.07 (0.30)
	D+E	0.62 (1.00)	0.25 (0.57)	0.12 (0.49)	0.23 (0.51)

[1]Minimum Wage. [2]Brazil Economic Classification Criterion. *p values (Mann-Whitney test), **p values (Kruskal-Wallis test). NS: not significant.

DISCUSSION

The decentralization and municipalization process undergone by health services has meant new spaces for the development of epidemiology in local services. Therefore, considering the changes occurred in the development pattern of caries, at a time of more widespread utilization of preventive measures, there is a need for studies that can follow the different age groups and health stages, contributing to the establishment of policies concerning the prevention and control or treatment of the main oral diseases.

In spite of the fact that dental caries is the most studied oral disease in the world, the majority of studies concentrate in schoolchildren, with not enough research on the situation of the disease in young adults[15]. Even though there are not sufficient data available regarding that population, including in industrialized, First World countries, one can believe that an improvement is occurring in the levels of the disease in the last decades. It seems that this situation is only manifesting itself in countries which, already in the 70's, presented a reduction in the caries experience of children and adolescents. Anyway, there still are researchers that are not sure whether these reductions are truly bringing real benefits to adult individuals or mean only a delay in the occurrence of carious lesions[4].

As concerns the group of Brazilian young adults, there are also no available data that may confirm the occurrence of a reduction in the cariogenic attack. Some local studies conducted in the last years in young and middle-age adults did not show any advances when their results were compared with the data presented by the 2002-2003 study sponsored by the Ministry of Health[5], in which youths of both sexes between 15 and 19 years were examined, and the findings were presented by region and not by town. Our investigation studied only 18-year-old males from a city in the Southern Region. In 2002-2003, the mean DMF-T index for the 15-19 age group of the Southern Region was 5.8, as compared to the 4.6 index found in the present study. Still referring to the 2002-2003 study[5], the filling component of the index for the same region was 3.3 (56.9%), revealing a significant increase trend of the DMF-T index when compared to the 80.5% found in the present study.

The caries prevalence found (82.6%) is similar to those of the Santa Cruz Province in Argentina (77.3% at the age of 18)[2], of Salvador, BA, Brazil (65.1% at the age of 15)[6] and of Florianópolis, SC, Brazil (81% at the age of 18)[9]. All of these observations were high, mainly when compared to the findings of Kelly *et al.*[10] (2000) in the United Kingdom, which indicated a caries prevalence of 51% and a mean DMF-T index of 1.6 among individuals 16 to 24 years of age.

A great demand for simple restorative treatment was observed in the studied population that can be characterized as routine clinical procedures, being the resolution of the existing problems consistent with the primary care level and with low costs. Inversely, the demand for complex treatments of the endodontic type was small (13.4%).

The favorable epidemiological picture observed in this study might be due to the specific characteristics of the city. Maringá, with a little more than half a century of existence, presents one of the highest rates of growth and development of the State of Paraná and also when compared to Brazil's overall growth rate. It has both a high per *capita* income and a high standard of living.

Although the results of this study cannot be extended to 18-year-old females from Maringá, a comparison of the studied population with that of the same city in relation to schooling demonstrates a great similarity[1]. Data from the Brazilian Institute of Geography and Statistics (IBGE) showed that, in 2000, 46.50% of the population at the age of 10 or above had completed at least seven years in school, as compared to 42.60% of the present study's population. In light of this parity, Army conscripts may be an alternative for epidemiological studies in oral health that aim to obtain information regarding the 18-year-old male population.

Nevertheless, a limitation still remains of not knowing the epidemiological pattern of the female population of the same age, whose access to services and behaviors are hypothetically different from those observed in the male gender.

CONCLUSIONS

The results of the present study allow to conclude that the epidemiological picture of a population of 18-year-old males from Maringá, PR, Brazil, is a favorable one, since dental caries prevalence and severity were considered low when compared to the adverse epidemiological profile of the majority of Brazilian young adults and the goals recommended by the World Health Organization.

It can also be concluded that the dental treatment needs of the studied population can be considered of easy resolution, through clinical-surgical procedures consistent with the primary care level.

The statistically significant differences found are unfavorable to the youths of low income and purchasing power. In the less favored social *strata*, the components related to dental treatment needs predominated. For the social classes D and E, some needs were four times greater than the values for class A. Hence, once more the need for the implementation of social policies that address the populations with worse social conditions was demonstrated. Such policies should be aimed at diminishing the differential in the indicators of the health-disease process and not merely modifying individual practices and habits.

Evaluation of the 18-year-old population is important to obtain a representation of the profile of oral diseases in young adults. This age is also a reference for the evaluation of oral health conditions at the international level, with a view to meeting the goals of the World Health Organization and the International Dental Federation.

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