ORIGINAL PAPER

DENTAL STATUS AND ORAL HYGIENE IN CHILDREN AGED 6-7 AND 11-12 FROM SZCZECIN, POLAND

Katarzyna Barczak, Agnieszka Witek, Mirona P. Palczewska-Komsa, Jadwiga Buczkowska-Radlińska, Agnieszka Chamarczuk

Department of Conservative Dentistry and Endodontics, Pomeranian Medical Univeristy in Szczecin, Szczecin, Poland

ABSTRACT

Introduction: Despite the continuing prevention and oral health educational programs, the incidence of caries in Poland among developmental age population remains high and shows an increasing trend in older age groups.

Objectives: The aim of the study was the assessment of dental status and oral hygiene in children aged 6-7 and 11-12 from urban areas.

Material and methods: The aim of the study was the assessment of dental status and oral hygiene in children aged 6-7 and 11-12 from urban areas. The study groups comprised of 313 children aged 6-7 (171 girls and 142 boys) and 292 children aged 11-12 (133 girls and 159 boys). We evaluated the number of permanent and deciduous teeth with caries (P, p), the number of teeth extracted due to caries (U, u), and the number of teeth with fillings due to caries (W, w). The results allowed for calculation of average PUW/puw number for permanent and deciduous teeth, and the frequency of caries. The study also provides the assessment of oral hygiene status using the approximal plaque index (API).

Results: The present study found that the frequency of caries with respect to deciduous teeth in children aged 6-7 was 76%, and in the group of children aged 11-12 (permanent teeth) it was 52%. The differences regarding sex in both age groups were not statistically significant, and amounted to 76% for boys and 75% for girls in the 6-7 age group, and 50% for boys and 58% for girls in the 11-12 age group.

Conclusions: The analysis of data obtained in our study shows a high frequency of caries in the 6-7 and 11-12 age groups. Oral hygiene status identified for both groups remains unsatisfactory. Therefore, it seems necessary to implement dental prophylaxis actions and promote health education among school-age children.

Key words: children, oral hygiene, caries.

J Stoma 2020; 73, 2: 50-54
DOI: https://doi.org/10.5114/jos.2020.96053

INTRODUCTION

Oral health is an integral part of general health. Dental caries, classified as a disease of affluence, is the most prevalent disease of masticatory system. In Poland, the incidence of dental caries is relatively high, both in children and adults. The underlying reasons for caries development are poor oral hygiene, cariogenic diet, low health awareness, and limited access to dental care. Despite the continuing prevention and oral health educational programs, in comparison with other European Union countries, the incidence of caries in Poland among developmental age population remains high and shows an increasing trend in older age groups [1, 2].

JOURNAL OF STOMATOLOGY
CZASOPISMO STOMATOLOGICZNE

Address for correspondence: Mirona P. Palczewska-Komsa, PhD, Department of Conservative Dentistry and Endodontics, Pomeranian Medical Univeristy in Szczecin, Poland, e-mail: Mirona.Palczewska-Komsa@pum.edu.pl

Received: 20.01.2020 • Accepted: 01.04.2020 • Published: 08.06.2020

OBJECTIVES

The aim of the study was the assessment of dental status and oral hygiene in children aged 6-7 and 11-12 from urban areas.

MATERIAL AND METHODS

The study was conducted in the period 2014-2017 and included 605 children who were the patients of dental office at the Primary School No. 7 in Szczecin, Poland. The study groups consisted of 313 children aged 6-7 (171 girls and 142 boys) and 292 children aged 11-12 (133 girls and 159 boys). Clinical examination was carried out only by one and the same dentist. Calibration was carried out related to all indicators used in the study. In this clinical study, the number of permanent and deciduous teeth with caries (Dt, dt), the number of teeth extracted due to caries (Mt, mt), and the number of teeth with fillings due to caries (Ft, ft) were evaluated. The results allowed for calculation of average DMFt/dmft number for permanent and deciduous teeth, and the frequency of caries. Additionally, the study provides the assessment of oral hygiene status using the approximal plaque index (API). Values were calculated according to the equation of API = x 100%. The values of API index in the range of 100-70% indicated poor oral hygiene, 69-40% showed average oral hygiene, and below 40% suggested relatively good oral hygiene. The study was conducted according to the World Health Organization (WHO) guidelines on epidemiological studies, with the use of artificial light and dental mirror and dental probe. The project was approved by the Bioethics Committee of the Pomeranian Medical University in Szczecin, Poland. The results of the study were recorded in every patient's chart and statistically evaluated. For the purpose of statistical analysis, all continuous variables were verified in terms of normality of distribution with Kolmogorov-Smirnov test. These variables were described as means, standard deviation, medians, quartiles, minimum, and maximum values. The statistical differences between the two groups were verified using Student' t test. For numerous groups, analysis of variance test (ANOVA) was applied. Non-continuous variables were described by the number and frequency of occurrence. For statistical analysis, the relationships between non-continuous variables were analyzed with Pearson's χ^2 test. In all analyses, the differences with p-value < 0.05 were considered as statistically significant. The statistical analyses were conducted with STATA 11 (2009) software, license number 30110532736.

RESULTS

The present study found that the frequency of caries with respect to deciduous teeth in children aged 6-7 was 76%, and in the group of children aged 11-12 (permanent teeth) it was 52%. The results are presented in Table 1. The differences in the obtained results for both age groups were statistically significant. The differences regarding sex in both age groups were not statistically significant, resulting in 76% for boys and 75% for girls in the 6-7 age group, and 50% for boys and 58% for girls in the 11-12 age group.

Data presented in Table 2 shows that at least 2 deciduous teeth in the 6-7 age group, and at least 1 permanent tooth in the 11-12 age group showed some signs of caries. The average number of deciduous teeth with fillings was also nearly 2, however for permanent teeth it was only 0.06. The values of the dental treatment index were found to be low both for deciduous and permanent teeth. Additionally, the study provides the assessment of oral hygiene status using the API index. The results are presented in Table 3.

A relatively good status of oral hygiene was found for only 10% of children aged 6-7, and merely 1% of children aged 11-12. Almost half of the children aged 6-7 and as much as 57% of children aged 11-12 indicated poor oral hygiene.

TABLE 1. Frequency of caries in the studied age groups according to sex

Age	puw > 0		puw = 0		Total
	n	%	*n*	%	
6-7	236	76	77	24	313
11-12	97	35	195	65	292
Pearson's χ^2	df = 3		113.83		p = 0.00000
R rang Spearman	t = –10.91		–0.41		p = 0.00000
Age	**PUW > 0**		**PUW = 0**		**Total**
	n	%	*n*	%	
6-7	36	11	277	89	313
11-12	157	52	135	48	292
Pearson's χ^2	df = 3		131.37		p = 0.00000
R rang Spearman	t = 11.91		0.44		p = 0.00000

TABLE 2. Mean values of puw and PUW component numbers and dental treatment index according to age

Age	*n*	mean	SD
		p	
6-7	313	1.95	2.52
11-12	292	0.37	0.92
		u	
6-7	313	0.08	0.36
11-12	292	0.03	0.20
		w	
6-7	313	1.68	2.27
11-12	292	0.55	1.31
6-7	313	puw	
		3.65	3.12
		w/p + w	
		0.44	
		P	
6-7	313	0.13	0.48
11-12	292	0.98	1.64
		U	
6-7	313	0	0
11-12	292	0	0
		W	
6-7	313	0.06	0.50
11-12	292	0.61	1.23
11-12	292	PUW	
		1.51	1.97
		W/P + W	
		0.39	

TABLE 3. Oral hygiene status according to age

Age	API			*p*
		n	%	
6-7	Relatively good	30	10	0.0000
	Average	130	41	
	Poor	153	49	
11-12	Relatively good	2	1	0.0000
	Average	124	42	
	Poor	166	57	

DISCUSSION

According to the WHO guidelines, by 2015, the prevalence of caries should have been reduced to 30% in the 6-7 age group [3]. However, the new objectives developed for European countries in the WHO Health 21 policy for Europe indicated that by 2020, 80% of children aged 6-7 will be caries-free, and the number of teeth with caries in the 11-12 age group should be no more than 1.5. The present study shows the frequency of dental caries among 6-7 years old's to be 76%. Moreover, the study did not identify statistically significant differences regarding sex in the aforementioned age group. A study on children aged 6 conducted between 2010 and 2012 by Jurczak et al. revealed similar results, with caries frequency of 63.8% [4]. The authors identified statistically significant higher frequency for boys (71.70%) than for girls (55.77%). Higher frequency of caries in children from the same age group was identified by Puacz *et al.* in Poznań, Poland, between 2009 and 2010 (73.1%), and by Chłapowska *et al.* in Lubuskie Voivodeship, Poland, during 2010 and 2011 (86.1% for children aged 6, and 87.7% for 7-year-old children) [5, 6]. Moreover, no statistically significant differences in terms of frequency of caries according to sex were found in these studies. Comparably high values were obtained by Gmyrek-Marciniak *et al.* in their study conducted in 2006. In this study, one hundred and seventy 6 years old's children were included and caries were identified in 85.89% of children, with higher frequency of caries found to be statistically significantly in boys than in girls (91.59% and 79.37%, respectively) [7].

The analysis of data concerning oral health of children aged 6 and 12 obtained from monitoring studies conducted in Poland in 2010, showed that frequency of caries in the group of 6-year-old children was merely 41.7% and in Zachodniopomorskie Voivodeshipm the percentage was 34.5% (the study included children from rural and urban population) [8-10]. This result is markedly lower both from the results obtained in the present study, as well as by other authors. By contrast, the results obtained for children aged 12 showed different proportions. Data of the Nationwide Dental Health Monitoring Programme from 2010 indicated the presence of caries in 79.8% of 12-year-old children from urban areas, whereas in the Zachodniopomorskie Voivodeship, the frequency was higher and amounted to 86.3% (children with caries in total). These results are markedly higher than those obtained in our study.

Average dmft number in 6-7-year-old group was 3.69, whereas the average DMFt number in the second studied group was 0.19. The differences between the obtained dmft and DMFt numbers regarding sex were not statistically significant. In their study conducted between 2010 and 2012, Jurczak *et al.* obtained the average dmft number at the level of 4.56 and DMFt at 0.43 [4]. However, this difference was not statistically significant. In a study from 2006, Gmyrek-Marciniak *et al.* showed a slightly higher average numbers of dmft and DMFt – 6.23 and 0.52, respectively [7]. This study identified high values of *p*, which on average was 4.86 and was statistically significantly higher for boys. As compared

to our study, higher dmft values were also obtained by Chłapowska *et al.* (5.37) and Bagińska *et al.* (7.37) [6, 11]. The values of average dmft number comparable to the present study were obtained by Puacz *et al.* [5], with the value of 3.33. Higher mean DMFt values in the analyzed group of children were obtained by Jurczak *et al.* (0.43) and Bagińska *et al.* (0.25) [4, 11]. However, the average DMFt value found by Chłapowska *et al.* was lower (0.08). An analysis of the monitor data from 2010 indicated comparable low value of DMFt index for the respective age group [6, 10]. The value of the dental treatment index in this age group obtained in the present study was 0.44. Studies by Składnik-Jankowska and Kaczmarek as well as Gmyrek-Marciniak *et al.* demonstrated values of this index to be lower (0.2 and 0.11, respectively) [9].

Our study revealed 52% of caries frequency in the 11-12-year-old group of children. Statistically significant differences regarding sex were not found. Study by Chłapowska *et al.* conducted on 12 years old's in Poznań identified higher frequency of carries – 60.67%. However, this results also did not show any significant differences in the frequency of caries according to sex [8]. Caries frequency in children aged 12 was comparable to that determined by Składnik-Jankowska and Kaczmarek, which was on average 90% [9].

In the group of 11-12 years old's, our study found that the average dmft number was at the level of 0.96 and DMFt at 1.58. Very similar average DMFt values were presented by Chłapowska *et al.* who showed caries of 1.59. However, the component DMFt number was found to be different (Dt – 0.55, Ft – 0.95, Mt – 0.02) [8]. Wierzbicka and Kaczmarek conducted a study on monitor data from 1999 to 2007 among 12 years old's, in which the intensity of caries expressed by DMFt values presented a downward trend: in 1999, it was 4.0 and in 2007, 3.07 [12]. According to oral health monitor data from 2010, the mean DMFt value was comparable to that from 2007 [10]. In the present study, the value of dental treatment index in this age group was 0.39. Slightly higher results were obtained by Składnik-Jankowska *et al.* – 0.52 [9]. Unfortunately, no data on dental treatment index was provided in above mentioned studies.

In addition, the present study provided the assessment of oral hygiene status in children from both age groups. In the 6-7-year-old group, mean API value was 64.87%, which indicates average oral hygiene status and demands an improvement of hygiene habits. Similar mean value of API index was determined in the 11-12-year-old group. Relatively good oral hygiene, i.e. below 39% of interdental spaces with plaque, was identified in 30 children (9.6%) from the group of 6-7-year-old children, and only in 2 (0.7%) from the group of 11-12 years olds. The literature on this subject lacks data on the assessment of oral hygiene status in healthy children aged 6-7. In 1998, with the use of oral hygiene index (OHI), Pawlaczyk-Kamieńska and Borysewicz-Lewicka conducted a study on oral hygiene status of 12 years old's, with mean value of 1.33 indicating a sufficient level of oral hygiene [13]. Analyzing a similar age group, Shamsa *et al.* attained a comparable mean OHI value of 1.12 [14]. However, the OHI value obtained in the same age group by Warsz and Rudnicka-Siwek was significantly lower: 0.43 [15].

The present study included a comparison of results obtained from the analyses of children from urban population. Despite similar composition of study groups, the outcomes differ significantly among other authors. This may be due to numerous factors including socio-economic status of study group, implementation of prevention programs in urban areas, availability of dental care in schools, and many others. Based on information provided in the aforementioned studies, the reasons behind different results were not identified.

CONCLUSIONS

The analysis of data obtained in our study shows a high frequency of caries in the 6-7 and 11-12 age groups. Furthermore, oral hygiene status identified for both groups remains unsatisfactory. Therefore, it seems necessary to implement dental prophylaxis actions and promote health education among school-age children. Such actions should be directed at children as well as their guardians.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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