

Elżbieta Jodkowska, Maria Wierzbicka, Ewa Rusyan, Izabela Strużycka

POLISH PUBLIC CARIES PROPHYLAXIS PROGRAMME FOR CHILDREN AGED 5, 7 AND 15 YEARS, IMPLEMENTED IN THE YEAR 2011

Department of Conservative Dentistry, Medical University of Warsaw

ABSTRACT

BACKGROUND. Continuous monitoring of oral health status improves the quality of dental health care and the effectiveness of implemented prevention programs.

OBJECTIVES. The aim of the study was to assess the caries status in three age groups of Polish children and evaluation of the effectiveness of the nationwide caries prophylaxis program, including fissure sealing of deciduous and permanent teeth.

MATERIAL AND METHODS - a group of 6 271 children, 5, 7 and 15 years old, coming from 16 provinces of Poland, was included in the epidemiological survey. The study was based on WHO guidelines (Oral Health Surveys).

RESULTS - the percentage of children covered by the prophylaxis program in 2011 was as follows: 5 years old – 3.8%, 7 years old- 48.3%, 15 years old – 7.2%. Five-year-old children took part in prophylaxis program in 4 provinces, seven-year-old children - in 10 provinces, and 15-year-old children - in 3 provinces. The percentage of five-year-old children with sealed primary and permanent teeth was 0.4% and 0.6%, respectively. In the group of seven-year-old children it was 1.7% and 16.4% respectively, whereas in the group of 15-year-old children, the percentage of sealed permanent teeth was 7.2%. The obtained results varied in different provinces of Poland.

CONCLUSIONS. Caries prophylaxis program developed for Polish children was implemented insufficiently, with significant differences depending on sex, age group and regional conditions. The total percentage of children with sealed primary and permanent dentition was very low on national scale, regardless of age and place of residence.

Key words: *dental caries prophylaxis, epidemiological study, fissure sealing*

INTRODUCTION

The National Surveillance on Oral Health Status, systematically carried out since 1997, shows that in Poland - in comparison with developed countries, as well as with a number of EU countries, which, like Poland, are subject to system transformation, the incidence of dental caries still remains at a high level (1-4).

A significant decrease in tooth decay in children and adolescents in developed countries is a result of preventive dental care such as implementation of fluoride prophylaxis programs and fissure sealing in posterior teeth where there is a high risk of developing tooth decay. This takes place immediately after the eruption of the teeth, because the tooth enamel is not fully mature and the grooves have a lower fluorine content compared to smooth surfaces of the tooth. Therefore, fissure sealing, i.e. isolation of the occlusal surface from harmful

environment of the oral cavity and bacteria, changes the structure of the enamel leading to a significant reduction in cavities (5).

The aim of this study was to evaluate the public nationwide prevention program implemented in 2011 combined with sealing treatment of posterior teeth in deciduous and permanent dentition in three age groups of five-, seven- and fifteen-year-olds.

MATERIALS AND METHODS

The epidemiological study included a total of 6271 individuals aged 5 and 7 and 15 years in 16 provinces in the country. The study was conducted with regard to the WHO guidelines (Oral Health Surveys) (1). The research was conducted on a randomly selected representative sample using comparable, internationally accepted criteria for assessing the clinical and epidemio-

logical indicators. The study used a dental mirror and a standard probe (WHO probe) in standardized lighting conditions. The research protocol has been approved for implementation by the Bioethics Committee of the Medical University of Warsaw, No. KBO/36/11 of 20 September 2011r. The children included in the study had parental consent for dental examination. Refusals in case of five-year-old children were sporadic, they were more frequent for adolescents aged 15 years. There were cases when the whole class refused to participate in a study, although it concerned individual schools, or, more rarely, provinces. In total, the survey covered 83% of the randomly selected sample of children.

RESULTS

The number of the examined children is presented in Table I. In the group of the 6271 studied children, the percentage of five-year-olds was 29%, seven-year-olds was 28.8% and 15-year-olds 42.2%. As far as gender, in five- and seven-year-olds there were slightly more boys than girls. With relevance to the region of residence, the percentage of five- and seven-year-olds was lower in urban areas and amounted to 28.9% and 28.3%, compared with the percentage of children living in rural areas - 29.1% and 29.5% respectively. For 15-year-olds, the percentage of urban children was slightly higher at 42.8% compared with the percentage of children in rural areas, who constituted 41.4%.

Altogether in the whole country in 2011, the percentage of children aged five years included in the fluoride prevention program was 3.8%, of children

aged seven years - 48.3% and of children aged 15 years - 7.2%. The percentage of five-year-old girls included in this prophylaxis was slightly higher (4.0%) than the percentage of boys (3.6%) and also significantly higher in children living in rural areas (7.6%) than urban areas (0.9%). In the group of children aged seven years, the fluoride prophylaxis program included a slightly higher percentage of girls (50.0%) than boys (46.7%) and significantly more children living in urban areas (57.3%) than children from rural areas (36.3%). In the whole country, the children aged 15 years covered by the fluoride prophylaxis program constituted 7.2% of the population, with more boys (7.8%) than girls (6.7%). A much higher proportion of individuals subjected to fluoride prophylaxis lived in rural areas (14.1%) than in urban areas (2.3%) (Table II).

Depending on the region of Poland, children aged five years covered by the fluoride prophylaxis constituted 3.8% in four of the country's 16 regions surveyed. The percentage of children covered by the prevention program in different regions was varied and ranged from 0.9% (Warmia and Mazury) to 36.1% (Świętokrzyskie), with 20.0% in the Łódź province and 11.1% in Lower Silesia.

Fluoride prophylaxis in children aged 7 years was carried out in 10 provinces in total (48.3%) and the percentage of children covered by the program ranged from 19.6% (lubelskie) to 100.0% (the provinces of Lower Silesia, Lubuskie, Małopolskie). In six provinces fluoride prophylaxis was not performed at all (Fig. 1).

Fluoride prophylaxis in 15-year-olds was performed only in 5 provinces that comprised only 7.2% of all studied individuals, mainly from rural areas (14.1%).

Table I. The number of children examined in 2011

Age	Total in Poland		Number/Percentage of Studied Individuals							
			Boys		Girls		Urban Regions		Rural Regions	
	L	%	L	%	L	%	L	%	L	%
5 years	1819	29	910	9.50	909	28.6	1044	28.9	775	29.15
7 years	1806	28.8	904	29.3	902	28.3	1022	28.3	784	29.49
15 years	2646	42.2	1274	41.2	1372	43.10	1547	42.8	1099	41.4
Total	6271	100.0	3088	00.0	3183	100.0	3613	00.0	2658	00.0

Commentary: L – number of children %- percentage of children

Table II. Percentage of children with sealed primary and permanent teeth in 2011

Wiek badanych (Age)	Ogółem w kraju (Total in the Country)		Odsetek badanych (Percentage of Studied Individuals)							
	zęby mleczne (primary teeth)	zęby stałe (permanent teeth)	Chłopcy (Boys)		Dziewczeta (Girls)		Rejony miejskie (Urban Regions)		Rejony wiejskie (Rural Regions)	
			Zęby mleczne (primary teeth)	zęby stałe (permanent teeth)	zęby mleczne (primary teeth)	zęby stałe (permanent teeth)	zęby mleczne (primary teeth)	zęby stałe (permanent teeth)	zęby mleczne (primary teeth)	zęby stałe (permanent teeth)
5	0.4	0.6	0.4	0.5	0.3	0.7	0.6	0.7	0.1	0.5
7	1.7	16.4	2.1	15.3	1.3	17.6	2.6	17.8	0.5	14.7
15	-	3.09	-	3	-	3.17	-	3.23	-	2.83

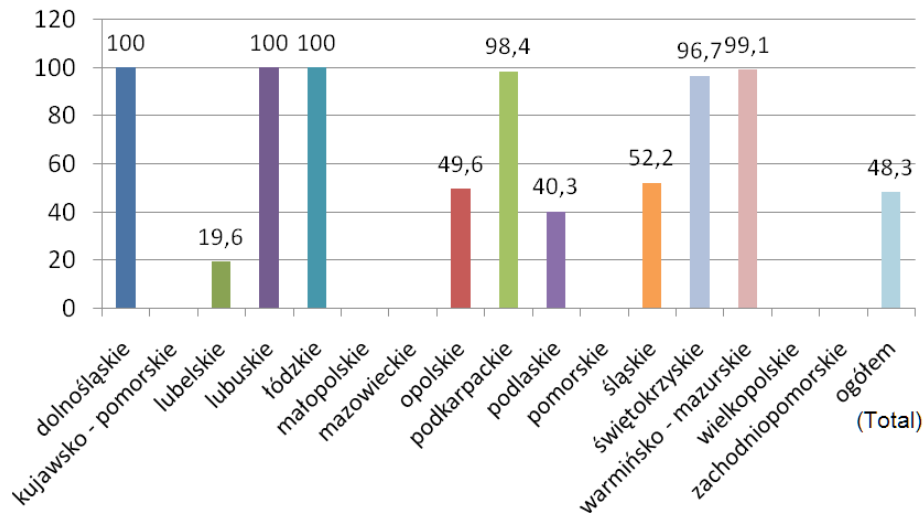


Figure 1. Percentage of seven-year-old children covered by prophylaxis program in various voivodships/provinces of Poland.

Children from urban areas accounted for 2.3%. The highest percentage of individuals covered by the prophylaxis was in the Opole province - 47.5% and in the Łódź province - 45.2%, in the Podlaskie province it was much lower at 30% and the lowest in the Wielkopolskie province 1.1% and in Silesia 0.6%.

Table III. Percentage of Children With Sealed Primary and Permanent Teeth in Provinces in 2011.

Województwo (Voivodship/ Province)	Odsetek dzieci i średnia liczba uszczelnionych zębów (Percentage of Children and Average Number of Sealed Teeth)				
	5 Years		7 Years		Average Number of Sealed Teeth
	M	S	M	S	
dolnośląskie	n/a	>1.5	>0	<20	2.42
kujawsko-pomorskie	n/a			<15	2.82
lubelskie	<1.0	n/a	>0	>20	2.98
lubuskie	n/a	>0.5	>0	=15	4.44
łódzkie	n/a	n/a	>15	n/a	3.87
małopolskie	n/a	>2.0	>0	>10	2.37
mazowieckie	<2.5	>1.5	>0	<25	3.0
opolskie	>1.5	n/a	n/a	<15	3.41
podkarpackie	n/a	=1.5	n/a	<10	3.17
podlaskie	n/a	<1.5	>0	<30	2.64
pomorskie	n/a	n/a	>5	<5	2.31
śląskie	n/a	n/a	>0	<15	1.97
świętokrzyskie	n/a	n/a		<15	3.27
warmińsko-mazurskie	<1.0	n/a	<5	>30	3.47
wielkopolskie	n/a	n/a	>0	>15	2.86
zachodniopomorskie	n/a	n/a	n/a	>20	4.55
Ogółem w kraju Total In Poland	<0.5	>0.5	>0	>15	3.09

Objaśnienie (Commentary):

M- zęby mleczne (primary teeth) < jest mniejsze niż (less than)

S- zęby stałe (permanent teeth) > jest większe (more than)

n/a - brak danych (no clinical data)

The presence of sealant in deciduous teeth in children 5 aged years was observed in 0.4% of the studied population. It was slightly higher in boys (0.4%) than in girls (0.3%) and higher among children living in urban areas (0.6%) than those living in rural areas (0.1%). Sealants in permanent teeth in a population of five-year-olds were reported in 0.6% of children, higher in girls (0.7%) than in boys (0.5%) and higher among children living in urban areas (0.7%) than in rural areas (0.5%). The presence of sealant in deciduous teeth in children aged 5 years was observed in less than 0.5% of those children in the whole the country. In three regions the presence of sealant was lower than 2.5%. These were the Lublin province, the Opole province, the Warmia and Mazury province (Table.III).

Overall, in the whole country, the percentage of children aged seven years covered by sealing treatment of deciduous posterior teeth was 1.7%. The percentage of sealed teeth was higher among boys (2.1%) than in girls (1.3%) and higher among individuals living in urban areas (2.6). In seven-year-olds, sealant was observed in deciduous teeth in eleven provinces of Poland. The highest percentage of children with sealed milk teeth was recorded in the Łódź region at > 15%, in the Pomeranian province > 5%, in the other provinces less than 5%. The presence of sealant in permanent teeth in children aged seven years in the country amounted to 16.4%. Depending on the gender, a higher percentage of sealed permanent teeth was observed in girls (17.6%) compared with the percentage of sealed teeth in boys (15.3%). It was also higher in urban residents (17.8%) compared with the percentage of children from rural areas (14.7%). Sealing of permanent teeth in children aged seven years took place in all provinces with the exception of Łódź. The highest percentages of children with sealed permanent teeth were in the Warmia-Mazury province > 30, in the Podlaskie province <30, in the

Lublin province > 20, in Mazovia <25 and in Western Pomerania > 20 (Table III).

Overall, in the whole country, the percentage of children aged 15 years with sealed permanent posterior teeth was 19.5%, on average on surfaces of 3.09 teeth (Table III). Depending on the gender, sealant was present a little more frequently in dentition of girls (3.17) than boys (3.0). More often in individuals living in urban areas (3.23) than in those living in rural areas (2.83). The presence of sealed posterior teeth was observed in all regions of the country. The lowest average number of sealed permanent teeth in 15-year-olds (1.97) was recorded in the provinces of Silesia, and the highest (4.55) in Western Pomerania and Lubuskie (4.44).

DISCUSSION

A comparison of the results of this study with the oral health status of children aged five years in Scotland, Denmark, England and Wales, shows a much poorer oral health of Polish children. In Scotland, the decay was found in 42.3% of children aged five years, while in Poland, in as much as 80% of children. A child in Poland an average has over three teeth damaged by decay more than a child in Scotland (2.3).

In 2003, the average percentage of sealed permanent teeth in children aged seven years in the whole country amounted to 21.9% (4). In addition, 0.6% of children also demonstrated sealed masticatory surfaces of deciduous teeth. The presence of the sealant on surfaces of permanent teeth was found in children in all regions. The percentage of children with at least one sealed permanent tooth ranged from 9.9% to 57.7%. Overall, in the whole country, over the years the level of sealing treatment of deciduous teeth in children aged six and seven years was low, ranging from 0.6% to 2.1%, and for sealed permanent teeth it was from 5.6% to 7.4% for six-year-olds and 21.9% for seven-year-olds (4).

Conducted epidemiological studies on children 7-12 years old living in the five largest cities of Lithuania, based on WHO criteria (World Health Organization), sealant was observed in posterior teeth of children aged 7-8 years in 85.5% of population, of children 9-10 years old in 88.9% of population, and of children aged 12 years in 70.6%. The incidence of caries increased with age. The average number of sealed teeth differed depending on place of residence and on age of the studied population. For seven-year-olds it was 1.31, for eight-year-olds 1.85, for nine-year-olds 1.29, for ten- and twelve-year-olds 1.15. Only half of the studied children demonstrated at least one sealed molar (5).

Comparison of the results of research conducted in 2005-2008 on the use of fluoride prophylaxis and professional methods of tooth decay prevention by

15-year-olds shows that in 2005 only 10% of children were covered by fluoride prophylaxis, and nearly half of the studied the population (49%) had sealed occlusal surfaces of two teeth on average (6.7). In 2008, 29.6% were using fluoride prevention, and 19.7% of children had an average of three sealed teeth. There were significant differences in the percentage of sealed teeth from 5.7% to 35.8% and in the average number of sealed teeth from 1.63 to 4.65 depending on the region. In the period of 3 years (from 2008-2011) a significant decrease was observed in the percentage of children aged 15 years covered by the fluoride prophylaxis program (from 29.6% to 7.2%). During the three years the average number of sealed teeth did not change, however (three teeth). Comparison of oral health status of children aged 5 and 15 years in Poland to the oral health status of children in Denmark indicates significant differences to the disadvantage of Polish children. In 15-year old children in Denmark, decay occurs in 64% of children, which is the lowest incidence of caries in Europe (8).

Based on the implemented evaluation of the effectiveness of the applied posterior tooth sealing in children and adolescents aged 6-18 years in 1998-2007 in dental practice in Dortmund, it was observed that in the population treated with sealing of posterior teeth using the international index of tooth decay DMF (Decayed, Missing, Filled) the index was much lower at 1.95, compared to the index in the population, in which the sealing procedure was not carried out. In this group, DMF index was 4.42. The reported prevalence of caries in the population with sealed posterior teeth was 16.41% lower than in the untreated population (9).

Another study conducted on Irish children aged 6, 12 and 15 years on the incidence of caries based on visual indicator for assessment of the severity of carious lesions ICDAS (International Caries Detection & Assessment System), the DMFT index and bitewing pictures in children aged seven and ten years showed that the value of DMFT index in six-year-olds was 0.12, in 12-year-olds 1.43, in children aged 15 years - 2.78, whereas after bitewing picture analysis, the value of the DMFT index value rose to 2.11 in 12-year-olds and up to 4.25 in 15-year-olds (10).

The evidence demonstrating the effectiveness of prophylactic sealing treatment of fissures in posterior teeth are, among other reports, 15-year-long studies on sealed teeth by the Author of this study. The treatment significantly inhibited the development of caries on the masticatory surfaces of sealed teeth and it affected caries severity reduction in whole dentition (11).

In light of these studies, the method of sealing masticatory surfaces of posterior teeth in this country is being applied more and more frequently, although it is used with a considerable delay with respect to the highly developed European countries, where the aim is

to maximize the use of the method in the public health sector, not only in individuals with high caries activity (12,13).

SUMMARY

The results of epidemiological studies in 2011 show that in Poland public prophylaxis programs operated to a small extent. The percentage of children covered by the prophylaxis program differed depending on age, gender, place of residence, and region of the country.

Sealing treatment of posterior teeth in the country in the studied age groups was carried out in a very low extent in index groups. The percentage of children aged five years covered by the prophylaxis program in 2011 was only 3.8% of all children, for seven-year-olds it was less than half the population (48.3%) and in children of 15 years it was only 7.2%. In all study groups also a very low level of sealed teeth was reported, both deciduous teeth and permanent ones.

CONCLUSIONS

1. The health status of children aged 5, 7 and 15 years in Poland is unsatisfactory and significantly worse than the health of children in European countries.
2. In the country, the simple methods approved fluoride caries prophylaxis and sealing treatment of masticatory surfaces of posterior deciduous and permanent teeth are still not used.
3. The lack of dental surgeries in schools, the lack of promotion of a healthy lifestyle, very low funds spent on prophylaxis, low affluence of the society mean that dental caries is a major health problem of the studied children.
4. The awareness of parents about the harmful consequences of dental caries should be increased, the healthcare sector should be activated in the promotion of prophylaxis, and community organizations should be interested in it to a higher extent.

REFERENCES

1. Peterson P.E, Bourgeois D, Bratthall D, Ogawa H. Oral health information systems –towards measuring progress in oral health promotion and disease prevention. *Bulletin of WHO* 2005, 83, 9, 686-693.

2. Jaeggi T, Lusi A. Prevalence incidence and distribution of erosion, Lusi (ed) *Dental Erosion. Monographs in Oral Science* Basel, Karger 2006, 20:44-65.
3. Moss E. *Dental Erosion. International Dental J* 1998; 48:529-539.
4. Wierzbicka M, Szatko F, Zawadziński M, Pierzynowska E. *Ogólnopolski Monitoring Zdrowia Jamy Ustnej i jego uwarunkowań. Polska 2003 MZ*, Warszawa 2004.
5. Saldūnaite K, Puriene A, Milciuviene S, Brukiene V, Kutkauskienė J. Analysis of dental caries prevention program in 7-12 year-old Lithuanians Schoolchildren. *Medicina (Kaunas)* 2009, 45 (11): 887-895.
6. Wierzbicka M, Jodkowska E, Szatko F, Pierzynowska E, Ganowicz M, Zawadziński M. Stan zdrowia jamy ustnej oraz potrzeby profilaktyczno-lecznicze dzieci w wieku 6 i 12 lat w Polsce w pierwszych latach procesu integracji europejskiej. *MZ*, 2005 rok.
7. Jodkowska E. Efficacy of pit and fissure sealing long-term clinical observation. *Quintessence Int* 2008, 39, 7:593-602.
8. Christensen LB, Petersen PE, Hede B. Oral health in children in Denmark under different public dental health care schemes. *Community Dental Health* 2010, 27:904-1001.
9. Siudmak B. Efektywność lakowania bruzd pierwszych i drugich zębów trzonowych u dzieci i młodzieży. *Obserwacje dziesięcioletnie. Magazyn Stomat.* 2009, 9, 132-138.
10. Agustsdottir H, Gudmundsdottir H, Eggertsson H, Jonsen SH, Gudlaugsson JO. Caries prevalence of permanent teeth a national survey of children in Iceland using ICDAS. *Community Dent Oral Epidemiol.* 2010, 38 (4): 299-309.
11. Jodkowska E, Wierzbicka M, Szatko F, Strużycka I, i wsp. Stan zdrowia jamy ustnej dzieci i młodzieży. *Monitoring zdrowia jamy ustnej. Polska 2008*, Warszawa 2008, ISBN 978-83-7637-024-8.
12. Morgan MZ, Farlane EMC, Stewart F, Hunter ML, Fairchild RM. An assessment of nutritional information in oral health education leaflets. *Community Dental Health* 2010, 27, 81-88.
13. Petersen PE, Kwan S. The 7th WHO Global Conference on Health Promotion – towards integration of oral health. *Community Dental Health* 2010, Suppl. 1, 27; 129-136.

Received: 21.05.2013

Accepted for publication 20.06.2013

Address for correspondence:

Prof.dr hab. Elżbieta Jodkowska
ul.Miodowa 18, 00-246 Warszawa
Tel: 22/502-20-32 Fax.:22 502-20-38
e-mail.e.jodkowska@gmail.com

