Izabela Strużycka[1], Ewa Rusyan[2], Agnieszka Bogusławska-Kapała[1]

PREVALENCE OF DENTAL EROSION IN YOUNG ADULTS AGED 18 YEARS IN POLAND

1. Department of Integrated Dentistry, Warsaw Medical University
2. Department of Conservative Dentistry, Warsaw Medical University

ABSTRACT

AIM. The aim of this study was to assess the prevalence of tooth wear in young adults in Poland.
METHODS. A total of 1,886 persons aged 18 years, selected on a basis of multistage sampling, were examined within the Nationwide Dental Health Monitoring Programme. Previously calibrated dentists measured tooth wear using the BEWE-scoring system (Basic Erosive Wear Examination).
RESULTS. Out of 1,886 young adults, 42.2% presented the signs of dental erosion. Considered the severity of erosion, it was graded as 1, 2 and 3 in 28.9%, 11.9% and 1.5% of 18-year-olds, respectively.
CONCLUSIONS. Results of clinical assessment of dental erosion in 18-year-old young adults revealed that erosive tooth wear is an important problem in this age group. Of them, 13.4% had signs of advanced tooth wear which may lead to serious clinical problems in the future.

Key words: *epidemiology, tooth wear, young adults*

INTRODUCTION

Recent changes in the lifestyle, eating habits, personal hygiene, which are observed in developed countries, resulted in an increased number of patients presenting non-carious lesions of dental hard tissues. There was a considerable increase in the consumption of acidic foods and beverages. It refers to the amount as well as the frequency of their intake. An increase in the consumption of acidic beverages is especially reported in a group of children and school children. Due to difficulties in conducting further studies on the prevalence of erosion, there is an appreciable disparity in the results presented in the literature of Western countries. An estimated 6 – 50% of children aged between 2-5 years presented erosion on deciduous teeth. Of children aged between 5 and 9 years, nearly 14% had erosion on permanent teeth. Prevalence of erosion in adolescents (9-17 years) ranged from 11 to 100% (1).

Available data suggest limited knowledge on dental erosion in a group of young patients. From one of the English studies, published in 2003, transpires that only 34% of children were aware of the problem of dental erosion. Of them, 40% considered regular tooth brushing to be the most effective method of erosion prevention. Only 8% of examined children were informed of this issue by their dentists (2). Many factors may affect such situation, including i.a. information deficiency, in comprehension of this problem and low quality of health education. Dental personnel and patients seem to be still inadequately informed on dental erosion.

Dental erosion is one of the non-carious lesions of dental tissues. Destructive processes affecting teeth include abrasion, attrition, abfraction and erosion. Abrasion is defined as a mechanical process of wearing away enamel or dentine resulting from tooth to foreign body or external substance contact. Strenuous and incorrect brushing, especially accompanied by the use of hard toothbrush and high-abrasive toothpaste (e.g. toothpaste for smokers, whitening toothpaste) is the common reason of abrasion. According to widespread hypothesis, excessive stress along tooth's vertical line may be a reason of straining in the region of tooth cervix which is frequently referred to as cementoenamel junction. Consequently, it may lead to microfractures and loss of tissues in this region. Such type of dental hard tissues wearing is called abfraction. Attrition is the successive form of enamel wearing which occurs frequently. It consists in direct, tooth to tooth contact without any interactions with foreign bodies. It may be a consequence

of parafunctional activity (bruxism) which is manifested by unintentional teeth grinding and gnashing, mainly while sleeping. Erosion is defined as the loss of dental hard tissues which is attributed to acidic substance or chelating agent effect. Acidic substances may be extrinsic or intrinsic and have an effect on plaque-free tooth surfaces. In contrast to caries, acidic substances are not produced by bacteria. Furthermore, any microorganisms are involved in the process of erosion (3-5).

In the early stages of erosion, the enamel surface of frontal teeth is smooth and glazed. Glossy areas which may become concave over time also appear. Such appearance is also observed in lateral teeth. In the later stages of erosion, cupping and grooving on occlusal surfaces of molar and premolar teeth are reported. Tooth cusps may become rounded and cupped lesions may appear on occlusal surfaces. Provided there are restorations in teeth, they rise above the level of the adjacent tooth surfaces. Usually dentine is exposed which appears as dark-yellowish areas. Patients who visit dentist complain frequently of dentine hypersensitivity or defects of cosmetic significance. In the most severe erosion cases, the whole enamel surface and partially the dentine may be destroyed.

As mentioned previously, acidic substances reduce the microhardness of enamel. Due to the significant loss of mineral content, dental hard tissues show decreased resistance to physical factors. Soft surface of tooth, which was exposed to the effect of erosive factors, is more prone to wearing. Consequently, erosion is often accompanied by atrition, abrasion and abfraction. Simultaneous appearance of different non-carious defects hinders their clinical assessment. Therefore, the term proposed by *Lussi* et al. is more frequently used, i.e. 'erosive tooth wear' (6).

General health or the presence of some diseases may have a significant impact on progression and course of dental erosion. Diseases accompanied by reduced salivary secretion are of special importance here. Typical reasons of hyposalivation are diseases of salivary glands (inflammation of salivary glands, sialolithiasis and some other diseases). Reduced salivary secretion is observed in patients diagnosed with diabetes (especially uncontrolled type 1 diabetes), autoimmune disease (Sjogren's syndrome, sarcoidosis, rheumatoid arthritis), depression, bulimia, anorexia nervosa and nutritional deficiencies (vitamin B, A and iron deficiencies) (7,8).

Reduced salivary secretion appears as a side effect of the treatment of head and neck cancers as these areas are exposed to radiation therapy. Most severe cases of hyposalivation are reported in patients treated with such method. In case of these patients, dental erosion progresses due to oral dryness as well as radiotherapy-induced changes of dental hard tissues. It should be also noted that reduction of salivary secretion is observed as drug side effects in case of many diseases.

Gastric acid, whose pH level is less than 1.5, is another important intrinsic cause of erosion. Erosive lesions caused by gastric acid may be observed in patients suffering from dysfunctions of lower esophageal sphincter, cardia or hiatus hernia. Patients with motor disorders of lower esophageal sphincter experience the episodes of regurgitation of gastric contents (gastro-oesophageal reflux disease). The most common symptoms of reflux are: heartburn, eructation, odynophagia, chest pain, nausea and vomiting. Regurgitated gastric contents firstly affect palatal surfaces of incisal teeth while in more severe and chronic cases - palatal surfaces and cusps of molar and premolar teeth (9).

Other, commonly reported reasons of dental erosion are eating disorders accompanied by vomiting, including bulimia and anorexia nervosa. In patients suffering from bulimia, erosive lesions appear mainly on the palatal surfaces of incisal teeth as well as buccal and occlusal surfaces of lower molar and premolar teeth.

Dental erosion is also a common phenomenon in patients with alcoholism. Reasons of erosion in alcoholics are: gastro-oesophageal reflux, unhealthy diet, dehydration and vomiting. In this group of patients, attrition is also reported, i.e. pathologic wear of teeth associated with bruxism (10). Higher risk of dental erosion occurrence is also observed in pregnant females. It results from the modifications of diet and vomiting, especially noted in the first trimester of pregnancy.

Relation between dental erosion and gastro-oesophageal reflux disease, bulimia and other disorders consisting in regurgitation of gastric contents is well documented. Such disorders are not common reasons of erosion, however, if they occur, tooth wear is more severe and consequently hard to heal. In such cases, cooperation between dentists and physicians of different medical specialties is required.

This study aimed at assessing the occurrence of non-carious lesions due to erosion in young adults in Poland.

MATERIAL AND METHODS

Clinical assessment of dental erosion in the population of 18-year-olds in Poland was conducted within the Nationwide Dental Health Monitoring Programme in 2012. Overall, 1,886 persons were recruited, including 956 females and 930 males. Approximately 55.3% of participants were living in urban areas. Dentition was assessed using the criteria of BEWE-scoring system (Basic Erosive Wear Examination). Presence of non-carious, erosive lesions was observed on labial/buccal, lingual/palatal and occlusal surfaces of all teeth, excluding third molars. Visual inspection was conducted in

six sextants into which oral cavity and dentition were divided: 17-14, 13-23, 24-27, 37-34, 33-43, 44-47. BEWE-scoring system is composed of four levels of erosion severity: 0 (no wear), 1 (early surface loss), 2 (surface loss < 50%) and 3 (surface loss > 50% in sextant examined) (11).

RESULTS

Clinical assessment showed that non-carious, erosive lesions of dental hard tissues were reported in nearly 42% of 18-year-olds. Initial lesions of enamel surface appeared more frequently in males (29.1%) compared to females (28.6%) likewise other types of lesions according to BEWE-scoring system. Lower percentage of persons with initial enamel changes was reported in persons living in rural than urban areas.

More advanced changes in dental hard tissues involving less than 50% of tooth surface were noted in 11.9% of examined persons living in urban areas. Such lesions were more frequently observed in males (14.5%) than females (9.3%). Advanced changes on examined tooth surfaces were rarely noted. Its distribution did not exceed 1.5% of the population of young adults (Table I).

Table I. BEWE-scoring system values in persons aged 18 years, recorded within the Nationwide Dental Health Monitoring Programme in 2012.

	BEWE = 0	BEWE = 1	BEWE = 2	BEWE = 3	Comparison (chi-squared test)
males	54.3%	29.1%	14.5%	2.0%	p < 0.001
females	61.0%	28.6%	9.3%	1.0%	
urban area	55.7%	30.5%	12.0%	1.8%	p = 0.17
rural area	60.2%	26.9%	11.7%	1.2%	
Total	57.7%	28.9%	11.9%	1.5%	

BEWE - Basic Erosive Wear Examination.

Table II. BEWE-scoring system values in persons aged 18 years, recorded within the Nationwide Dental Health Monitoring Programme in 2012 in seven selected provinces.

Provinces	BEWE = 0	BEWE = 1	BEWE = 2	BEWE = 3
Dolnośląskie	52.0%	32.8%	15.2%	0
Kujawsko-Pomorskie	30.1%	45.2%	24.4%	0.3%
Lubelskie	51.8%	41.8%	6.1%	0.3%
Lubuskie	68.7%	22.2%	8.6%	0.5%
Mazowieckie	65.7%	11.7%	14.3%	8.3%
Podkarpackie	88.8%	10.8%	0.4%	0
Warmińsko-Mazurskie	56.5%	31.8%	11.4%	0.3%
Comparison (chi-squared test)	p < 0.001			
Total	57.7%	28.9%	11.9%	1.5%

Table II presents the values of BEWE-scoring system in persons aged 18 years noted in seven selected provinces. The highest number of young adults who scored BEWE=0, i.e. no wear was reported in Podkarpackie province. Initial enamel changes were most commonly noted in Kujawsko-pomorskie (45.2%) and Lubelskie (41.8%) provinces. In Kujawsko-pomorskie province, the most frequent changes observed were those graded as 2. In the majority of provinces, low percentage of examined persons with BEWE=3 (0.3%-0.5%) was reported. The highest value of BEWE-scoring system, i.e. BEWE=3, for whose typical is the extensive tissue loss, was observed in 8.3% of examined persons exclusively in Mazowieckie province while no persons with advanced, non-carious lesions were reported in two provinces.

DISCUSSION

In recent years, interest in non-carious lesions, especially those resulting from erosion has raised. Compared to the erosion prevalence specified in Polish literature, its value obtained in studies conducted within the Nationwide Dental Health Monitoring Programme was higher (12,13).

Study conducted by Waszkiel in 2000 in a group of 540 persons revealed that the prevalence of erosion differ significantly with regard to age and place of residence. The highest percentage of persons with erosion was reported in the age groups 25-30 years (19.44%) and 18-20 years (15%) while the lowest in the age group 35-44 years (6.11%). Persons living in large urban areas were exposed to erosive factors to the largest extent. In the age group 18-24 years, erosive changes appeared in

33.33% of examined persons (12). The present study suggest higher values of erosion prevalence (44%).

From the observation on the prevalence of non-carious lesions in the population of Cracow transpires that relatively low percentage of persons presented the symptoms of dental erosion. They were mainly reported in elder persons while in the age group 15-18 years it was assessed at 2.4% (13). The results of the Nation-wide Dental Health Monitoring Programme suggest that the prevalence of erosion in adolescents increased significantly in the last decade.

Erosive lesions of dental tissues were observed in a significant percentage of persons aged 18 years (42.3%). Its value was considerably higher compared to the one noted in adolescents aged 15 years (24.7%), population examined in 2011 (15). The most common were initial enamel changes which did not require invasive treatment. Advanced enamel changes (13.4%) suggested the necessity for adherence to dietary and hygiene recommendations with the objective to increase the resistance of dental tissues to acidic substances, monitoring the patient, attending visits every 6-12 months and in many cases considering reconstructive treatment of teeth. Facts that nearly a half of young adults had at least one tooth with erosive lesions and that such problem is noted in younger persons in Poland raise concerns.

Similar observations were made in many European and American countries. Their results unequivocally suggest that the prevalence of erosion, especially in adolescents is on the increase. It is mainly attributed to the changes in lifestyle, eating habits and personal hygiene.

Prevalence of dental erosion in the population of 18-year-olds is comparable to the one described in foreign literature. From studies conducted in Oslo, Norway transpires that more than 54% of population at this age had dental erosion (15). Similar results are reported by *Bartlett* et al. on the basis of European studies conducted in seven countries in a group of 3,187 persons aged 18-35 years. BEWE-scoring system equal to 0 was reported in 42.9% of examined persons. In the remaining persons, changes which did not exceed 50% of tooth surface were predominant (BEWE=1 - 27.7% and BEWE=2 – 26.1%) (16). Considerably higher prevalence and severity of non-carious lesion was suggested in the Swedish studies conducted in a group of young adults aged 20 years. Of them, 75% had signs of non-carious lesions which represents an exceptionally adverse phenomenon in such young age group (17).

Dental erosion is a widespread phenomenon in highly developed countries. However, the comparison of epidemiological studies results is hindered by the use of different standards, calibration and indices as well as heterogeneity of groups studied. Independent observations are of special importance to identify the threats and determine the trends as to initiate adequate prophylactic measures. An increase in the prevalence of dental erosion implies that there is a necessity to implement widespread education and prophylactic actions. Severe dental changes are associated with irreversible dental tissue lesions and consequently require expensive and long-term treatment aiming at restoring the function and aesthetics of dentition.

CONSLUSIONS

Erosive tooth wear is reported in a significant percentage of examined persons aged 18 years in Poland with males predominated over females.

In the recent decade, an increase in the prevalence of dental erosion, especially in adolescents, is observed.

REFERENCES

1. T Jaeggi, A Lussi. Prevalence, Incidence and Distribution of Erosion, Lussi (ed): Dental Erosion. Monographs in Oral Science. Basel, Karger 2006; 20: 44-65. Based: T Jaeggi, A Lussi: Prevalence, Incidence and distribution of Erosion. Monogr. Oral Sci. Basel, Karger 2006; 20: 44-63.
2. S Moss. Dental Erosion. Inter Dental J 1998; 48: 529-539.
3. M Addy, R P Shellis. Interaction between Attrition, Abrasion and Erosion in Tooth Wear, Lussi (ed): Dental Erosion. Monographs in Oral Science. Basel, Karger 2006; 20: 17-31.
4. S Brauman-Furmanek. Ubytki niepróchnicowego pochodzenia, w: Kariologia współczesna, postępowanie kliniczne, praca zbiorowa (ed): D Piątowskiej. Med Tour Press International 2009: 349-355.
5. C Ganss. Definition of Erosion and Links to Tooth Wear, Lussi (ed): Dental Erosion. Monographs Oral Science. Basel, Karger 2006; 20: 9-16.
6. A Lussi. Dental erosion. From diagnosis to therapy. Monographs in Oral Science. GM Whiteford. Vol 20 .
7. B Gandara, E Truelove. Diagnosis and Management of Dental Erosion. J. Contemp. Dent. Pract. 1999; 1: 16-23.
8. B Nauntofte, J Tenovuo, F Lagerlöf. Wydzielanie i skład śliny. W: Próchnica zębów. Choroba próchnicowa i postępowanie kliniczne (ed): O Fejerskova i E Kidd. Wyd Med Urban & Partner 2006: 5-28.
9. D Barlett. Intrinsic Causes of Erosion, Lussi (ed): Dental Erosion. Monographs in Oral Science. Basel, Karger 2006; 20: 117-139.
10. K Gibiński, E Nowakowska-Duława. Choroby przełyku, w: Choroby wewnętrzne, praca zbiorowa pod red. F Kokota. Warszawa: PZWL 2001: 257-271.
11. D Bartlett, C Ganss, A Lussi. Basic Erosive Wear Examination (BEWE): a new scoring system for scientific and clinical needs. Clinical Oral Invest 2008;12:65-68.
12. D Waszkiel. Nadżerki nietypowe szkliwa-etiopatogeneza, klinika i zapobieganie w świetle badań własnych. Ro-

zprawa habilitacyjna. Akademia Med. Bialostocensis, Białystok 2000.
13. D Fijał, A Kaczmarczyk-Stachowska, Z Knychalska-Karwan, M Chomyszyn-Gajewska, M Ciesielska, B Gawrzewska, H Kwapińska, A Sendur. Występowanie ubytków niepróchnicowego pochodzenia w populacji wieku 15-80 lat w Krakowie. Czas Stomat 2001; 54(10):636-641.
14. M Wierzbicka, F Szatko, I Strużycka, E Rusyan, M Ganowicz, M Zawadziński, A Garus-Pakowska. Stan zdrowia jamy ustnej i jego uwarunkowania oraz potrzeby profilaktyczno-lecznicze dzieci wieku 5,7,15 lat. Monitoring Zdrowia Jamy Ustnej 2011. ISBN 978-83-7637-115-3.
15. A Mulic, R Skudutyte-Rysstad, AB Tveit, AB Skaare. Risk indicators for dental erosive wear among 18-yr-old subjects in Oslo, Norway. Eur J Oral Sci 2012;120(6):531-538.
16. DW Bartlett, A Lussi, NX West, P Bouchard, M Sanz, D Bourgeois. Prevalence of tooth wear on buccal and lingual surface and possible risk factors in young European adults. J Dent 2013;41(11);1007-1013.
17. H Isakssen, D Birkhed, LK Wendt, A Alm, M Nilsson, G Koch. Prevalence of dental erosion and association with lifestyle factors in Swedish 20-year olds. Acta Odontol Scand, 2013, Nov 28.

Received: 18.02.2014
Accepted for publication: 23.07.2014

Address for correspondence:
Assoc.prof. Izabela Strużycka
Department of Integrated Dentistry
Medical University of Warsaw
Miodowa 18, 00-246 Warsaw
Tel. 22 502 20 32
E-mail: istruzycka@gmail.com