Dental caries in adult Lithuanians

Rasa Skudutyte, Jolanta Aleksejuniene and Harald M. Eriksen
Clinic of Stomatology, University of Vilnius, Vilnius, Lithuania; Department of Cariology, University of Oslo, Oslo, Norway

Skudutyte R, Aleksejuniene J, Eriksen HM. Dental caries in adult Lithuanians. Acta Odontol Scand 2000;58:143–147. Oslo. ISSN 0001-6357.

There are few data on the incidence of dental caries in Lithuanian adults. The aim of the present study was to describe caries and treatment experience among 35–44 and 65–74-year-olds, and to relate this to certain selected independent variables (gender, urban/rural residence, drinking water fluoride levels, and years of education). A total of 680 subjects selected based on a stratified random sampling procedure (response rate 52%) were examined by one examiner. Dental caries was recorded as DMFT following the WHO recommendations. The results showed that the median DMFT scores were 18 for the 35–44-year-olds ($n = 380$) with median DT = 2, MT = 5, FT = 7. For the 65–74-year-olds ($n = 300$) the median DMFT was 24, with DT = 1, MT = 18, FT = 2, respectively. One percent of all 35–44-year-olds and 11% of 65–74-year-olds were edentulous. In the younger age group, statistically significant differences in the DMFT scores were related to gender, urbanization and drinking water fluoride levels. Participants from areas with high fluoride content in the drinking water (>1.5 ppm F/l) had lower DT, MT, and FT values. Females and participants from urban areas had higher numbers of FT. Participants with more years of education had lower DT, MT, and higher FT values. In the elderly, DMFT scores were related to water fluoride levels and years of education. Individuals with more years of education had higher numbers of FT and lower MT values in this age group. Poor oral hygiene was associated with high numbers of DT in both age groups. The data indicate that dental caries is widespread among adult Lithuanians. □ *Adults; dental caries; epidemiology*

Rasa Skudutyte, Clinic of Stomatology, Zalgirio 115, 2042 Vilnius, Lithuania. Tel. +370 2 727345, fax. +370 2 728576

Oral health conditions have improved in a majority of industrialized countries during recent decades. The documented decline in dental caries among children and adolescents (1, 2) seems to have been followed by improved dental health among adults, as manifested by increased numbers of retained teeth, reduced numbers of untreated carious teeth, and a decreased prevalence of edentulousness (3–8). However, this is not the pattern in many Eastern European countries, including the Baltic states, where prevalence of dental caries among children and adolescents is still high (9). Very little is known about dental caries among adults.

The aims of the present study were to describe caries as experienced by 35–44 and 65–74-year-old Lithuanians, and to relate differences in disease experience to gender, urbanization, drinking water fluoride levels, years of education, and levels of oral hygiene.

Material and methods

The participants were selected by a random sample stratified according to urbanization and natural water fluoride levels. In most of Lithuania the fluoride content in the drinking water is low (0–0.5 ppm F/l). The Western part is an exception, where the concentration of natural fluoride in the central water supply varies from 1.5 up to 5 ppm F/l in some areas (10). Thus, among 5 urban and 5 rural areas selected for the study, 2 urban and 1 rural area were from regions with high drinking water fluoride content. Random samples of participants from the selected areas (in total 1350 individuals) were drawn by the National Statistical Department.

The selected subjects were invited to participate in the investigation in a letter explaining the purpose of the survey. Non-responders were sent a second letter and, if still no response, a third. Home visits and telephone calls were also made where possible. Individuals were excluded from the initial sample if the reason for non-response was a change of address, temporary absence during the study period, or death (where the information was available). The final study sample comprised a total of 1311 individuals (767 in the 35–44-year-old group and 544 in the 65–74-year-old group).

Data collection included a clinical examination and a questionnaire filled in by the participants. In the present paper, only information about participants' gender, place of residence (urban or rural), and years of education (primary education <12 years, continuing education 12–14 years, and higher education >14 years) was used. The clinical examination was performed in a dental chair using chairside illumination. All surfaces of every tooth were examined using the visual tactile method with plane mouth mirrors and regular dental probes in accordance with the WHO criteria for caries diagnosis (11). Caries experience, including root and crown caries, was recorded as DMFS for 32 teeth. The DMFT index and its components (DT, FT, MT) were calculated from DMFS recordings. The

Table 1. Caries experience in 35–44-year-olds

	All participants ($n = 380$)			Dentate ($n = 377$)		
	Mean	Median (1st, 3rd quartiles)		Mean	Median (1st, 3rd quartiles)	
DMFT	17.4	18	(12; 23)	17.2	18	(12; 23)
DT	3.3	2	(1; 5)	3.3	2	(1; 5)
MT	6.2	5	(3; 8)	6.0	5	(3; 8)
FT	7.9	7	(3; 12)	7.9	7	(3; 12)
DMFS	62.8	59	(37; 86)	62.0	59	(36; 86)
DS	7.5	3	(1; 10)	7.5	3,5	(1; 10)
MS	31.3	25	(15; 40)	30.2	25	(15; 40)
FS	24.0	20	(6; 38)	24.2	21	(7; 39)

Table 2. Caries experience in 65–74-year-olds

	All participants ($n = 300$)			Dentate ($n = 268$)		
	Mean	Median (1st, 3rd quartiles)		Mean	(Median 1st, 3rd quartiles)	
DMFT	23.3	24	(17; 30)	22.3	23	(17; 29)
DT	2.3	1	(0; 3)	2.6	2	(0; 4)
MT	18.5	18	(10; 27)	16.9	17	(9; 24)
FT	2.5	2	(0; 4)	2.8	2	(0; 4)
DMFS	109.3	117	(74; 150)	103.2	105	(68; 140)
DS	6.9	2	(0; 8)	7.7	3	(0; 9)
MS	92.7	90	(50; 135)	84.7	85	(45; 150)
FS	9.7	6	(0; 15)	10.8	8	(1; 16)

oral hygiene status of participants was assessed by the oral hygiene index (OHI-S) and Debris Index scores were used for the analysis (12).

Data collection was carried out by one examiner (J.A.) during 1997–98. A re-examination of 34 participants after a period of 2 h was done with an intra-examiner consistency of 98% for DMFT and 94% for DS scores (13).

The data were computerized and analyzed using the SPSS statistical program package. Median and mean values, quartiles, and cumulative frequency distributions were used for data description. Bivariate comparisons were performed using the Mann-Whitney U and Kruskal Wallis tests. The level of significance was set at $P \leq 0.05$.

Results

Response rates in the study were 50% and 55% among the 35–44 and 65–74-year-olds, respectively. A total of 380 subjects representing the younger age group and 300 subjects the older group were clinically examined. In order to evaluate possible bias due to low response rates, information from non-responders was collected. One-hundred-and-thirty (34%) of the 35–44-year-old and 78 (32%) of the 65–74-year-old non-responders were contacted by telephone or home visits. Their indicated main reasons for non-response were lack of time, lack of interest (35–44-year-olds) and health problems (65–74-year-olds). Comparisons of the main socio-demographic characteristics of non-responders and participants showed only minor differences related to urbanization and education. Thirty-one percent of the interviewed non-responders in the older age group reported themselves as edentulous compared to 11% observed in the study. There were no edentulous individuals among interviewed non-responders in the younger age group.

Three people (1%) in the 35–44-year-old group were totally edentulous. Among the 65–74-year-olds, 15% were edentulous in one jaw and 11% totally edentulous. The median number of teeth present was 27 for dentate 35–44 and 15 for 65–74-year-olds. Caries scores for both age groups are presented in Tables 1 and 2.

As shown in Fig. 1, distribution of DMFT scores and its components was skewed, except DMFT for 35–44-year-

Table 3. Caries experience in relation to selected variables

	35–44-year-olds (median)					65–74-year-olds (median)				
	n	DMFT	DT	MT	FT	n	DMFT	DT	MT	FT
Gender										
Females	210	20‡	2	6*	10‡	135	23	1†	17.5	3‡
Males	168	15	2	5	4.5	127	22	2	16	1
Residence										
Urban	281	19*	2†	5	9‡	176	23	1†	17	3†
Rural	99	16	3	5	4	92	23	2	16	2
Water fluoride										
Low	257	20‡	3‡	6†	9†	159	25*	2	18	2
High	123	13	1	4	7	109	21	1	15	2
Education										
Low	108	16.5	3‡	6‡	4‡	144	24	1	19†	2
Medium	159	18	2	5	8	66	23	2	17	2
High	113	19	1	4	10	57	19	2	11	3

Mann-Whitney U and Kruskal-Wallis tests. * $P < 0.05$, † $P < 0.01$, ‡ $P < 0.001$.

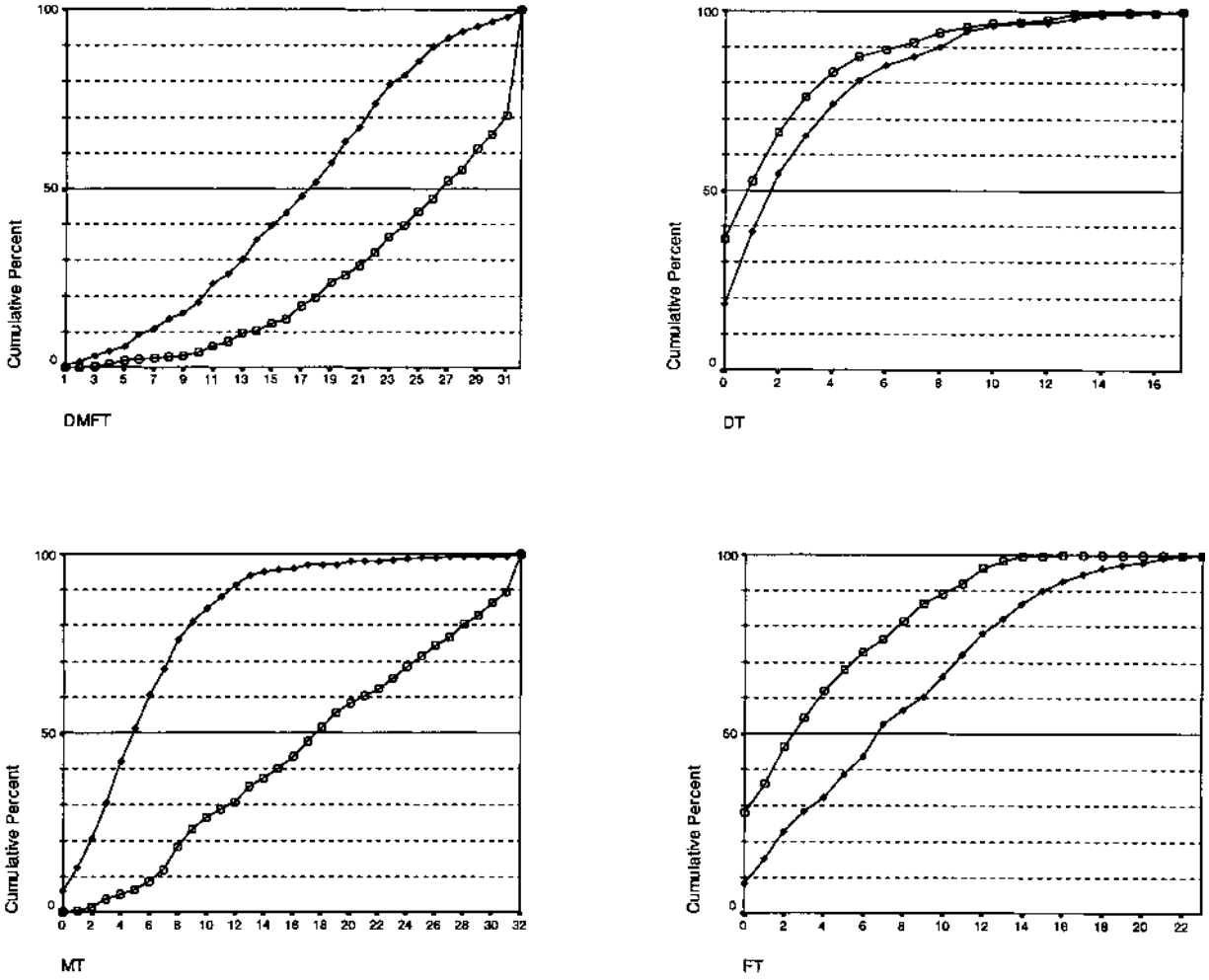

Fig. 1. Cumulative frequency distributions of DMFT, DT, MT, and FT scores in dentate 35–44 (— ◆ —) and 65–74-year-olds (— ○ —).

olds. Only about 18% of the participants in the younger and 32% in the older age group had no teeth with untreated decay.

Variation in caries and treatment experience in relation to the selected variables was observed in both age groups (Table 3). Participants from areas with high drinking water fluoride content (>1.5 ppm F/l) had lower DMFT scores in both age groups and also lower values for all the separate DMFT components. Statistically significant differences were observed among 35–44-year-olds only. In both age groups, females and urban participants had higher numbers of filled teeth.

Although there were no differences in the total DMFT scores among the three education groups of 35–44-year-olds, significant differences were found when comparing the separate components of the DMFT scores. Individuals with higher education (>14 years) had significantly fewer decayed, missing and more filled teeth compared with individuals from the other two education groups (Table 3).

Among the elderly, significant differences in number of MT were only observed among the three education groups. Individuals with high education had significantly less MT compared with the other two education groups (Table 3).

In order to assess the relationship between different levels of plaque scores and number of decayed teeth, participants were grouped into three groups according to the Debris Index scores (DI-S) (Table 4). Comparisons of the groups revealed that individuals with high Debris Index scores (DI-S > 2) had a higher median number of DT.

Discussion

The stratified sampling technique applied in the present study and subsequent non-proportional random selection of participants from the different strata were done for analytical purposes and resulted in an overrepresentation of participants from areas with high fluoride content in the

Table 4. The relationship between plaque scores and median numbers of decayed teeth

	35–44-year-olds		65–74-year-olds	
Oral hygiene (DI-S)	*n*	DT	*n*	DT
DI-S < 1	196	2	61	1
DI-S 1–2	151	2	100	2
DI-S > 2	28	4.5	45	3
		$P = 0.002$		$P = 0.000$

Kruskal-Wallis test.

drinking water. Taking into account the considerable differences in caries experience observed in relation to water fluoride levels in both age groups, the possibility of underestimation of the true caries experience introduced by the larger proportion of participants from high drinking water fluoride areas should be considered.

The response rates in the study were 50% and 55% for 35–44 and 65–74-year-olds, respectively. Although there have been suggestions that low attendance rates do not necessarily compromise the results of epidemiological studies (14), information obtained in the present study indicates that there might be slight differences between responders and non-responders. Considering the less favorable oral health conditions among individuals with lower education and differences in edentulousness observed in the study, the results from non-responders may indicate a slight overestimation of oral health status in the population. This is in accordance with other studies where non-responders seemed to have inferior oral health conditions compared to the sample (15–17).

In the present study, the WHO criteria for recording caries were used, which means that caries was recorded at a late stage of progression (cavitation) and no radiographs were taken. A possible underestimation of the total caries experience of the population surveyed should therefore be taken into account (18, 19).

The caries measure used was DMFT score calculated for a 32-teeth dentition. All missing teeth, regardless of the reason for their loss, were calculated as the M-component. Although there are suggestions that caries in industrial countries is the main reason for tooth loss up to the age of 60 years (20), a substantial amount of tooth loss due to periodontal disease, especially after the age of 45, has been reported as well (21). Non-disease factors, such as treatment philosophy, dentist, and patient values related to the maintenance of teeth, may also play a certain role (22), resulting in a possible overestimation of tooth loss due to caries.

Some uncertainty might be introduced by the F-component as well. The importance of the acknowledged limitations related to epidemiological caries diagnosis should therefore be considered when interpreting the data (19, 23). When all factors related to possible deviations from the true caries prevalence levels in the populations under investigation are considered, an overall underestimation is likely.

The results indicate that all individuals in the study have experienced dental caries. However, marked variations in dental conditions were observed in selected population subgroups. As indicated in Fig. 1, 82% of 35–44 and 68% of 65–74-year-olds had untreated and decayed teeth and thus a need for operative treatment. This indicates that a majority of the adult population in Lithuania is in need of both restorative and preventive intervention. Number of filled teeth was low in both age groups, with a median of 7 FT for 35–44 and 2 for dentate 65–74-year-olds. This, on the one hand, may be the result of considerable proportions of extracted teeth. On the other hand, teeth with secondary caries may have been contributing to the lower FT scores as well.

The proportion of edentulous 65–74-year-olds observed in the study was lower than reported from Latvia (16%), Poland (42%), and former Eastern Germany (29%) (24). However, a possible underestimation of edentulousness from the study could be expected considering the low response rate. The only previous study on dental caries among 35–44-year-olds in Lithuania from 1984 reported a mean DMFT of 14.2 (25). The mean DMFT observed in the present study was 17.4.

Marked variations in caries experience were observed when comparing different population subgroups. In bivariate comparisons, high drinking water fluoride levels were associated with low caries experience. It is known that high levels of fluoride in the drinking water have a marked effect in reducing dental caries, and this effect is maintained as long as the water is consumed (26–29). Studies in adults show a 15–35% reduction in caries experience in lifelong residents from optimal or high water fluoride compared with low fluoride areas (30). The differences in total DMFT scores observed in the present study were 22% and 12% for the younger and older age groups, respectively. In order to estimate full benefit from the drinking water fluoride content, only continuous residents of the area should be examined (26). This was not considered in the present study. Another important factor that might have influenced the results, especially in the countryside, was the proportion of individuals living in high fluoride areas but consuming water from private wells with negligible amounts of fluoride (10). However, the proportions of these individuals and magnitude of the impact on the results is difficult to estimate. Despite the factors that might have underestimated the effect of water fluoride in the study, the observed differences in caries experience indicate that high fluoride levels have a beneficial impact on dental caries in Lithuanian adults. The differences observed are mostly due to the effect of drinking water fluoride, because any additional fluoride sources in the country were not commonly used before 1990 when fluoride toothpaste became gradually available.

Caries experience varied among genders. It has been observed that females generally present with higher DMFT scores than males (31). The remarkably higher DMFT scores among females in the younger age group in the present study was mostly due to the considerably higher FT component.

For both age groups, restorative treatment experience (FT) was significantly higher among urban participants. This might partly be due to higher caries levels in urban areas, and partly to lower utilization of dental services by rural individuals (32). Higher numbers of teeth with untreated decay among rural participants in both age groups might support the latter assumption (Table 3). Whether due to the lack of availability of dentists in rural areas or to financial or cultural factors that might influence dental care habits (32) remains unknown.

While there were no differences in the total caries experience among the subgroups in relation to years of education, the distribution of the separate DMFT components differed. In the younger age group, differences were observed in numbers of decayed, missing and filled teeth; the elderly differed in number of MT only. The 35–44-year-olds with higher education had fewer decayed and missing teeth compared with the other two education subgroups. The 65–74-year-olds with the highest education had less MT compared with the other two groups. The findings are similar to those reported from other studies (24), where adults with higher education tend to have less decayed and missing teeth.

All independent variables studied seemed to be associated with disease and treatment experience. However, in the present study all factors were analyzed in bivariate comparisons and it is not clear if they are directly associated with caries or related through indirect relationships (33).

References

1. Marthaler TM. The prevalence of dental caries in Europe update 1990–1995. Caries Res 1996;30:237–55.
2. Petersson HG, Bratthall D. The caries decline: a review of reviews. Eur J Oral Sci 1996;104:436–43.
3. Downer MC. The improving oral health of United Kingdom adults and prospects for the future. Br Dent J 1991;23:154–8.
4. Fehr von der FR. Caries prevalence in the Nordic countries. Int Dent J 1994;44:371–8.
5. O'Mullane D, Whelton H. Caries prevalence in the republic of Ireland. Int Dent J 1994;44:387–91.
6. Berset GP, Eriksen HM, Bjertness E, Hansen BF. Caries experience of 35-year-old Oslo residents and changes over a 20-year period. Community Dent Health 1996;13:238–44.
7. Steele JG, Walls AWG, Ayatollahi SMT, Murray JJ. Major clinical findings from a dental survey of elderly people in three different English communities. Br Dent J 1996;180:17–23.
8. Schuller AA. Changes in oral health in adults, Trøndelag, Norway, 1973–1983–1994 [Thesis]. Oslo: University of Oslo; 1999.
9. Bjarnason S. High caries levels: problems still to be tackled. Acta Odontol Scand 1998;56:176–8.
10. Macyte L, Drulyte I, Kucingis S. Biomikroelementozes. Jodo ir fluoro nepakankamumo problemos Lietuvoje, ju sprendimo budai. Sveikata 1996;11:16–8.
11. World Health Organization. Oral Health Surveys. Basic methods. 3rd ed. Geneva: WHO; 1987.
12. Greene JC, Vermillion JR. The simplified oral hygiene index. J Am Dent Assoc 1964;68:25–31.
13. Aleksejuniene J, Eriksen HM. Variation in caries and treatment experience in 35–44-year-old Lithuanians. Community Dent Oral Epidemiol. In press.
14. Locker D. Effects of non-response on estimates derived from an oral health survey of older adults. Community Dent Oral Epidemiol 1993;21:108–13.
15. Salonen L. Oral health status in an adult Swedish population [Thesis]. Malmö: University of Lund; 1990.
16. Bjertness E. A multidimensional study of dental health in urban Norwegian adults [Thesis]. Oslo: University of Oslo; 1990.
17. Steele JG, Walls AWG, Murray JJ. Methodological issues in sampling a population of the elderly for a dental survey. Community Dent Health 1995;12:77–82.
18. Kirkegaard E, Knudsen WS, Grønbaek L, Poulsen S. Comparison of X-ray and clinical caries recording in nationwide sample of adult Danes [Abstract]. Caries Res 1987;21:187.
19. Kidd EAM, Pitts NB. A reappraisal of the value of the bitewing radiograph in the diagnosis of posterior approximal caries. Br Dent J 1990;169:195–200.
20. Manji F, Fejerskov O. An epidemiological approach to dental caries. In: Thylstrup A, Fejerskov O, editors. Textbook of clinical cariology. Copenhagen: Munksgaard; 1994. p. 159–91.
21. Klock KS. A multidimensional study of aspects relating to extraction of permanent teeth in Norway [Thesis]. Bergen: University of Bergen; 1995.
22. Turunen S, Nyysönen V, Vesala H. Perspectives of poor dental health and its determinants. Community Dent Health 1992; 10:49–55.
23. Whelton H, O'Mullane DM. Public health aspects of oral diseases and disorders. In: Pine CM, editor. Community oral health. Oxford: Wright; 1997. p. 75–82.
24. Chen M, Andersen RM, Barmes DE, Leclerq MH, Lytte CS. Comparing oral health systems. A second international collaborative study. Geneva: World Health Organization; 1997.
25. World Health Organization Country profiles on oral health in Europe 1991. Copenhagen: WHO Regional Office for Europe; 1991.
26. Murray JJ. Adult dental health in fluoride and non-fluoride areas. Part 1. Mean DMFT values by age. Br Dent J 1971; 131:391–5.
27. Eklund SA, Burt BA, Ismail AI, Calderone JJ. High-fluoride drinking water, fluorosis, and dental caries in adults. J Am Dent Assoc 1987;114:324–8.
28. Murray JJ, Rugg-Gunn AJ, Jenkins GN, editors.. Fluorides in caries prevention. Oxford: Wright; 1991. p. 64–75.
29. Wiktorsson AM, Martinsson T, Zimmerman M. Caries prevalence among adults in communities with optimal and low water fluoride concentrations. Community Dent Oral Epidemiol 1992;20:359–63.
30. Newbrun E. Effectiveness of water fluoridation. J Public Health Dent 1989;49:279–89.
31. Burt BA, Eklund SA. Dentistry, dental practice and the community, 5th ed. Philadelphia: W.B. Saunders Company; 1999.
32. Petersen PE, Holst D. Utilization of dental health services. In: Cohen L, Gift HC, editors. Disease prevention and oral health promotion. Copenhagen: Munksgaard; 1995. p. 342–87.
33. Beck JD, Kohout F, Hunt RJ. Identification of high caries risk adults: attitudes, social factors and diseases. Int Dent J 1988;38:231–8.

Received for publication 23 December 1999
Accepted 18 April 2000