

Dental Treatment Needs in Lithuanian Adolescents

Vilma Brukiene, Jolanta Aleksejuniene, Irena Balciuniene

SUMMARY

The aims were to estimate dental treatment needs of 15-16-year-olds in Lithuania and to relate a number of background factors such as gender, urbanization and residency to possible differences in dental treatment needs. A total of 885 adolescents in 22 randomly pre-selected areas were clinically examined. The following criteria of dental treatment needs were used: tooth with primary caries, secondary caries, tooth which needs a non-operative treatment, tooth with trauma, which needs a restorative treatment, and tooth which needs either an endodontic treatment, a crown or an extraction. Only 7.7% of all participants had all their teeth sound. The treatment due to primary caries was the most required dental treatment modality among Lithuanian adolescents. Significantly fewer teeth required treatment due to other aforementioned reasons. Significant differences in most dental treatment needs between boys and girls were found, whereas in relation to urbanization and area of residency the differences were less pronounced.

Key words: adolescents, dental treatment need, urbanization, gender

INTRODUCTION

The decline in caries prevalence in industrialized countries was anticipated in the late 1970s and a substantial reduction in dental caries prevalence in Western countries occurred after 1980s [1, 2]. Regarding the permanent dentition, further reduction is observed in the 12-year age group, these being even more evident at the ages of 15–19 years [3].

Lithuania, one of the Eastern European countries, showed little tendency towards a decline in the prevalence of dental caries. Nevertheless, we can find data indicating a slight caries reduction in 15-year-olds from an average of DMFT 6.2 in 1986 to 5.6 in 1993 [3]. Another study conducted in Lithuania in 1993 [4], reported the mean DMFT score for the same 15-year-old group to be 7.0 (with 8.0 DMFT for the low-fluoride area and 4.4 for the high-fluoride area). These findings relate to an important starting-point and coincide with many important political, economical changes, which started in 1991 in most Eastern European countries. Children are most likely to be the first victims of the unemployment, inflation, decline in family income and privatization of dental practice [3]. On the other hand, increased availability of Western standard oral hygiene products, especially fluoridated toothpaste and qualitative toothbrushes, initiated a decline of dental caries. In order to examine the trends of caries development in Lithuania, the same regions as in 1993 were repeatedly examined in 2001. The decrease of DMFT index among Lithuanian adolescents was found: the average DMFT score was 6.3 in the low-fluoride area and 3.1 in the high-fluoride area [5].

At present, a new stage in the history of Lithuania has begun. In May 2004, Lithuania joined the European Union and population expects new standards of oral health and

dental treatment. Lithuanian authorities prioritize dental care for children. However, Lithuania with its limited monetary resources may face a difficulty to allocate enough resources to offer free and good quality dental treatment for all children and adolescents. Until 1991, all children were entitled to regular annual dental check-ups and treatment, but after 1991, the school-based dental service has gradually discontinued. Today's adolescents are growing up with a full availability of fluoridated toothpaste and other modern oral hygiene products and there is a lot of information about proper oral hygiene methods in mass media.

In the literature we can find significant variations in caries prevalence among different geographical areas in Lithuania [5,6]. There is a lack of the national comprehensive studies, where many regions of the country are covered. Most studies were performed in the biggest cities of Lithuania. The comparison of these studies shows regional differences; for instance, in the study, conducted in Kaunas city, the mean DMFT among 12-year-olds was 3.3 [6], whereas in the regions examined by Aleksejuniene et al. [7] it was 4.9. This difference was explained by a higher dentist-patient ratio in Kaunas city than in other parts of the country [6]. Indeed Kaunas region has the highest number of dentists – 9.5 (for 10,000 inhabitants), followed by the number of 7.5 in Vilnius and 6.1 in Klaipeda region [8]. In other regions the number of dentists comprises 4.2–5.4 for 10,000 inhabitants. According to Hicks MJ, Flaitz CM [1] the increased availability of dental practitioners allows for an increased accessibility of dental care. The question can be raised, if the lowest number of children with unmet dental treatment needs will be found in the regions with the highest number of dentists.

Most epidemiological studies, estimating children's dental health, were conducted using the DMFT or DMFS indices. DMFT, DMFS indices have been the most widely employed epidemiological indices in caries research. However, the DMFT and DMFS indices do not adequately reveal the true treatment need [9]. New therapeutic and preventive concepts have created a demand for the methods helpful to answer specific questions, such as severity of disease, extent of the lesions and needs for specific treatments [10]. Moreover, populations with predominantly small lesions have different treatment needs than populations with extensive caries, causing the need for pulpal treatment.

¹Institute of Odontology, Faculty of Medicine, Vilnius University, Lithuania.

²Institute of Community Dentistry, Faculty of Dentistry, University of Oslo, Norway.

*Vilma Brukiene*¹ - D.D.S., assistant professor.

*Jolanta Aleksejuniene*² - D.D.S., M.Sc., PhD.

*Irena Balciuniene*¹ - D.D.S., PhD, Hab.Dr., Professor, Director of Institute of Odontology, Faculty of Medicine, Vilnius University.

Address correspondence to: Vilma Brukiene, Institute of Odontology, Zalgirio 115, Vilnius 08217, Lithuania.
E-mail: vilmabruk@hotmail.com

Knowledge of actual treatment need can help assess priorities for different measures to be undertaken within population [9]. The establishment of unmet dental treatment needs would be a positive step in further reducing caries prevalence [1]. Therefore, a new study estimating dental treatment needs is of particular importance.

The aims of the present study were 1) to estimate dental treatment needs in Lithuanian adolescents and 2) to describe possible differences in dental treatment needs related to gender, urbanization and different geographical regions.

MATERIALS AND METHODS

Sample

The study was performed in September–December 2004 after receiving the permission from the Ministries of Health and Education of Lithuania. The sampling scheme was as follows. Lithuania is divided into 10 districts. In each of these districts two areas – one urban and one rural – were chosen randomly. There are localities with high fluoride content ($F > 1,0$ ppm) in the drinking water in Western part of the country [11]. In order to secure enough participants from the latter part, two areas - one urban and one rural - were added. The total sample was extracted from 22 areas (Fig. 1). One secondary school was chosen randomly in each of these pre-selected regions. In each school, two or three classes of 15-16-year-old children were invited for the examination. Only children who had written approval forms, signed by themselves and by their parents, were included into the study. The minimum of 32 and maximum of 50 individuals from one school was examined. Because of the obligatory school attendance till 16 years of age, the present sample can be considered as a representative sample of 15-16-year-old Lithuanians.

Data collection

The data for the present study were collected following the general principles for basic oral health surveys of the World Health Organization [12]. Clinical examinations were performed by one examiner (VB). A portable halogen lamp as a light source was used and each subject was examined lying on a simple school table using caries explorer and plane mouth mirror for the clinical examinations. Radiographs were not taken. The following criteria of dental treatment needs for each tooth were used: tooth with primary caries, tooth with secondary caries, tooth which needs a non –

operative treatment, tooth with trauma, which needs a restorative treatment and tooth which needs either an endodontic treatment, a crown or an extraction. Differences in dental treatment needs were related to a number of background factors such as gender, urbanization and residency in different geographical regions. The operationalization of the study variables is presented in Table 1.

Data analysis

The statistical data analysis was done using the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA, 1997). The following statistical analyses were performed: frequency estimations, independent samples *t* test and One-Way Analysis of Variance (ANOVA). Two groups were compared by means of *t* test and more than 2 groups were compared by means of ANOVA. The level of statistical significance was assumed when $p = 0.05$.

RESULTS

A total of 885 adolescents participated in the present study. Only 68 of them (7.7 %) had all their teeth sound, i.e. their teeth had no decay or fillings. Among the other participants 112 (12.6 %) had 10 or more teeth with either decay or fillings, or both. The total of 24808 teeth were examined, of which 4687 were affected irreversibly either by caries and/or by treatment experience. Percentual proportions of sound and affected teeth are illustrated in Figure 2.

The Figure 2 does not include teeth requiring a non-operative treatment as only reversible lesions can be treated with such treatment. A total of 103 teeth were found with demineralizations which comprises about 0.42 % of the total percentage of the examined teeth.

More than half (60.8 %) of the affected teeth had fillings. The treatment due to primary caries was the most required dental treatment modality. Only 26.3 % of the participants were free from primary caries. Significantly fewer teeth required the treatment due to secondary caries or due to other aforementioned reasons (see Figure 3).

Of all, 233 (26.33 %) of participants were free from primary and 566 (66.2 %) – from secondary caries. Frequencies of primary and secondary caries are shown in Figure 4.

Gender and dental treatment needs

The gender differences with regard to dental treatment needs were assessed applying the independent samples *t* test (Table 2). It can be seen that the mean number of teeth

Table 1. The operationalization of the study variables.

Variable	Operationalization
Tooth with primary caries	A tooth where a lesion is either in a pit or fissure, or on smooth tooth surface, has a softened floor, undermined enamel or a softened wall [12].
Tooth with secondary caries	A tooth which has both a filling and a decay. Carious lesion is in physical association with the restoration [12].
Tooth needs a non – operative treatment	A tooth surface has an obvious white demineralization (precavitation), which can be treated with a remineralising, caries arresting treatment [13].
Tooth with trauma, which needs a restoration	A tooth where loss of tooth substance is confined to enamel and dentine [13].
Tooth needs an endodontic treatment	A tooth needs pulp care because of deep and extensive caries or because of trauma [12].
Tooth needs a crown	A tooth with an extensive restoration, which due to excessive masticatory force might fracture either the remaining tooth structure or the restoration. A tooth presents a significant loss of vertical dimension of tooth structure [14].
Tooth needs an extraction	Tooth in which caries destroyed the crown and it cannot be restored as only the roots remained [12].
Gender	Boy, girl
Urbanization (urban, rural)	Urban includes all city areas such as Kaunas, Klaipėda, Palanga, Taurage, Telsiai, Siauliai, Panevezys, Vilnius, Utena, Marijampole and Alytus. Rural includes all region areas namely Prienai region, Skuodas region, Kretinga region, Plunge region, Silale region, Pakruojas region, Pasvalys region, Sirvintos region, Anyksciai region, Sakiai region, Lazdijai region.

Table 2. Dental treatment needs in Lithuanian adolescent boys and girls.

VARIABLE	BOYS N=350	GIRLS N=531	95 % CI
	Mean ± SD	Mean ± SD	
Number of teeth with primary caries	2.30 ± 2.18	2.02 ± 2.02	[- 0.000175; 0.56]
Number of teeth with secondary caries	0.54 ± 0.93	0.71 ± 1.19	[- 0.32 ; -0.0213]
Number of teeth with trauma which need a restoration	0.04 ± 0.25	0.0132 ± 0.11	[0.00255; 0.0511]
Number of teeth which need a non-operative treatment	0.11 ± 0.40	0.12 ± 0.44	[-0.0713; 0.0436]
Number of teeth which need an endodontic treatment	0.12 ± 0.48	0.00772 ± 0.34	[-0.0082;0.00995]
Number of teeth which need a crown	0.03 ± 0.19	0.07 ± 0.31	[-0.08 ; -0.01]
Number of teeth which need an extraction	0.0629 ± 0.28	0.0414 ± 0.23	[-0.0126; 0.0554]

Table 3. Dental treatment needs in Lithuanian adolescents in urban and rural areas.

Variable	Urban n=439	Rural n=447	95 % CI
	mean ± SD	mean ± SD	
Number of teeth with primary caries	1,99±2,00	2,27±2,18	[-0,56;-0,00634]
Number of teeth with secondary caries	0,68±1,14	0,61±1,05	[-0,074;0,21]
Number of teeth with trauma which need a restoration	0,0273±0,21	0,0201±0,14	[-0,0165;0,0309]
Number of teeth which need a non-operative treatment	0,13±0,46	0,11±0,38	[-0,0335;0,0783]
Number of teeth which need an endodontic treatment	0,0797±0,35	0,11±0,44	[-0,0823;0,0226]
Number of teeth which need a crown	0,07±0,29	0,04±0,25	[-0,01;0,06]
Number of teeth which need an extraction	0,0319±0,20	0,0671±0,29	[-0,0683;-0,00217]



Figure 1. Lithuanian districts and visiting areas.

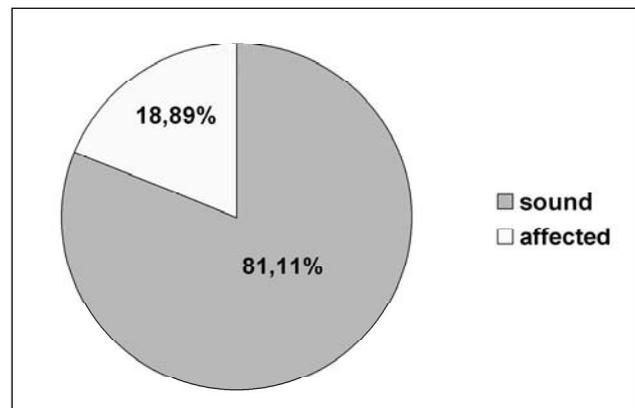


Figure 2. The percentage of sound and affected teeth in Lithuanian adolescents.

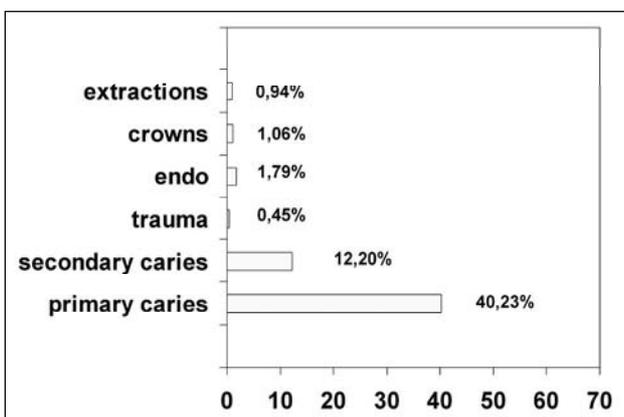


Figure 3. Dental treatment needs in Lithuanian adolescents.

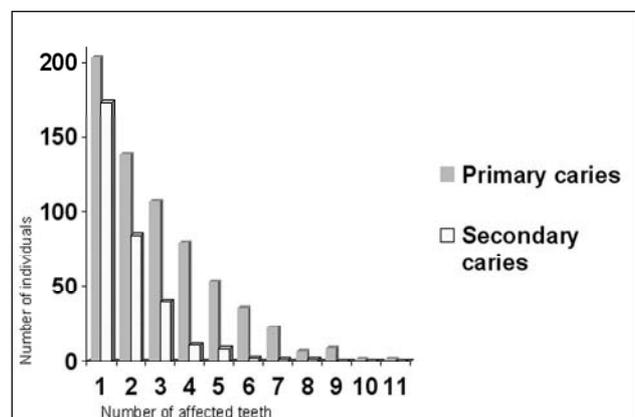


Figure 4. Frequency of primary and secondary caries in Lithuanian adolescents.

Table 4. Dental treatment needs in Lithuanian adolescents in different geographical regions.

District	Teeth with primary caries	Teeth with secondary caries	Teeth with trauma, need restoration	Teeth, which need non-operative treatment	Teeth, which need an endodontic treatment	Teeth, which need a crown	Teeth, which need an extraction
	mean±SD	mean±SD	mean±SD	mean±SD	mean±SD	mean±SD	mean±SD
Alytus N=76	2,67±2,14	1,18±1,73	0,0263±0,16	0,2±0,61	0,12±0,46	0,07±0,3	0,0921±0,37
Marijampole N=76	2,32±2,20	0,33±0,66	0,00±0,00	0,0921±0,47	0,0921±0,44	0,04±0,2	0,0526±0,22
Kaunas N=78	2,01±2,05	1,06±1,39	0,0256±0,16	0,33±0,7	0,1±0,38	0,06±0,25	0,0385±0,25
Vilnius N=78	2,19±1,99	0,58±0,90	0,0128±0,11	0,0513±0,22	0,21±0,65	0,05±0,27	0,0513±0,22
Utena N=87	2,56±2,27	0,85±1,08	0,0115±0,11	0,0575±0,23	0,0805±0,31	0,1±0,37	0,0920±0,36
Panevezys N=70	1,70±1,84	0,66±1,15	0,0286±0,24	0,0143±0,12	0,0857±0,28	0,1±0,3	0,00±0,00
Siauliai N=86	1,99±2,17	0,64±1,17	0,0581±0,35	0,13±0,40	0,0465±0,21	0,05±0,26	0,0233±0,15
Telsiai N=84	1,96±1,88	0,57±0,85	0,0476±0,21	0,0714±0,26	0,0476±0,21	0,02±0,15	0,00±0,00
Klaipėda N=159	2,12±2,16	0,42±0,84	0,0189±0,14	0,10±0,39	0,0692±0,41	0,01±0,08	0,0503±0,08
Taurage N=91	1,80±2,02	0,44±0,73	0,0110±0,10	0,13±0,45	0,13±0,43	0,11±0,43	0,0879±0,32
p value*	0,070	0,000	0,606	0,000	0,324	0,086	0,126

*groups compared by ANOVA test

which need non-operative dental treatment was almost identical in boys and girls. There were differences between gender groups with regard to other dental treatment need modalities, but statistically significant differences were found only in mean numbers of teeth with primary caries, secondary caries, in mean numbers of teeth with trauma and in mean numbers of teeth needing a crown. In general, girls had more teeth with secondary caries and their treatment need for crowns was higher than boys, whereas boys had significantly more teeth with primary caries and needed more dental restorations due to trauma.

Residency and dental treatment needs

Moderate differences in dental treatment needs were found between urban and rural groups. In general, adolescents from urban and rural areas had similar dental treatment needs, except that the rural children had significantly more teeth with primary caries and more teeth which needed to be extracted than the urban children (Table 3).

The differences among geographical regions of Lithuania with regard to dental treatment needs were also estimated. As it can be seen in Table 4, districts did not differ significantly in the mean number of teeth with primary caries, teeth which needed either an endodontic treatment, a crown, an extraction or a restoration due to trauma. Statistically significant differences were found with regard to the mean number of secondary caries and with regard to the mean number of teeth which needed a non-operative treatment. A more detailed analysis among the regions was performed using the latter two variables.

With regard to the mean number of teeth which needed a non-operative treatment Kaunas district had the highest mean number of aforementioned teeth and Panevezys district had the lowest one. Kaunas district distinguished significantly from almost all other regions. Adolescents from Kaunas district had significantly more teeth with demineralizations than children from other areas, except Alytus district, which differed significantly only from Vilnius, Utena and Panevezys districts ($p < 0.05$). Statistically significant differences were also found between Panevezys district and

either Siauliai or Taurage districts ($p < 0.05$).

With regard to the secondary caries, the picture was not so clear, because the results were more scattered. The highest mean number of teeth with secondary caries was found in Alytus district, whereas Marijampole, the neighbouring region, showed the lowest mean number of teeth with secondary caries ($p < 0.001$). In general, adolescents from all regions, except Kaunas and Utena areas, had significantly fewer teeth with secondary caries than their counterparts in Alytus district ($p < 0.05$).

DISCUSSION

The study revealed substantial unmet dental treatment needs among Lithuanian adolescents mainly due to primary caries as only ¼ of all participants were free from primary caries. This finding is of utmost importance as it may indicate some deficiencies in Lithuanian dental care system. Until 1991, when a school-based dental service was available, all pupils were under regular supervision of the dental staff. After then, dental care was left on a voluntary basis. Although free dental care for children and adolescents till 18 years of age is guaranteed by Lithuanian law, due to lack of both staff and resources, the public dental care can not offer free regular dental care even for children. Despite the increasing number of dentists in Lithuania, most of them prefer working in the private sector. Although the private sector offers a modern dental treatment, a substantial part of Lithuanian population can not afford private dental services.

Significant differences in most dental treatment needs were found between boys and girls. Having higher mean number of teeth with secondary caries and higher treatment need for crowns, but lower mean number of teeth with primary caries than boys, girls are likely to take better care of their teeth. It is also important to bear in mind that in general dental caries is more common in girls [7, 15, 16].

The higher mean number of traumatized teeth in boys can naturally be explained by their active lifestyle [17].

The finding of the present study that dental caries is more common in rural than in urban areas complies with

several other studies both from Lithuania and other countries [5,7,15]. High mean numbers of primary caries and teeth which need to be extracted may suggest that children are not treated sufficiently in rural areas. It is likely, that adolescents from economically deprived areas may have difficulties in gaining a proper dental treatment. The situation probably is even more aggravated because of considerable shortage of dental staff in rural areas. Newly graduated dentists prefer to stay in urban rather than in rural areas because of the better financial resources, more favourable working and living conditions. Consequently, there is an uneven distribution of dentists in Lithuania and the majority of them are concentrated in big cities. This problem of uneven distribution of dentists has also been reported in other countries [15]. Private dental service in urban areas is also less accessible for rural inhabitants because of the distance and because of the difference in living standards.

Primary caries is obviously a problem in the whole country because there were found no statistically significant differences between the districts in mean numbers of teeth with primary caries. The hypothesis that dental treatment needs are the lowest in the regions with the highest number of dentists was not confirmed. Moreover, Kaunas district, which always had the highest dentist/patient ratio, had the highest mean number of teeth which needed a non-operative treatment. The mean number of teeth with secondary caries was also higher in Kaunas district than in all other regions, except in Alytus district. The findings of the present study regarding teeth with precavitations were similar to the results of the study, conducted in Kaunas city almost 10

years ago in a sample of 12-year-olds [6]. In 1995 it was reported, that the majority (62%) of active caries lesions were at the non-cavitated stage. The authors of the latter study suggested, that the most feasible way to control dental caries in the country with economical difficulties is to introduce simple preventive measures such as fluoride-containing dentifrices in combination with dental education of the population. Now fluoride toothpastes are of overall accessibility. However, high mean number of teeth, which need a non-operative treatment and high mean number of teeth with secondary caries may suggest that adolescents are still lacking dental education.

With regard to secondary caries, some findings were unexpected. Two neighbouring districts showed different results, e.g. Alytus district had the highest and Marijampole district – the lowest mean number of teeth with secondary caries. It has been reported that the development of the secondary caries depends on several reasons, e.g. filling material, qualification of the dentist, oral hygiene etc.

CONCLUSIONS

1. Despite the positive changes in dental caries prevalence, Lithuanian adolescents have high level of unmet dental treatment needs.

2. The highest dental treatment need in Lithuanian adolescents is due to primary caries.

3. The results indicate inadequate accessibility of dental service, especially in rural areas.

4. There are the differences in dental treatment needs between gender groups and among different geographical regions.

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