The severity of malocclusion and need for orthodontic treatment in correspondence with the age

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SUMMARY

Awareness of the age related situation as to the malocclusion prevalence in population and orthodontic treatment need is very important and useful for planning an orthodontic care, especially taking into account the interdisciplinary aspect of the problem. The aim of this study was to investigate the degree of severity of malocclusion and the need of orthodontic treatment in three different age groups of population in Latvia. The study group comprised samples of 12-13-yr-olds (n=46), 18-yr-olds (n=32) and 35-44-yr-olds (n=278). The Index of Complexity, Outcome and Need (ICON) was used for the assessment of the results.

In order to provide the accuracy use of ICON, more than 4 missing teeth and prosthetic restorations were chosen as an exclusion factor for the age group 35-44 years. A statistically significant difference was determined between the mean ICON values in 12-13 and 18 year-old age groups. Professionally defined orthodontic treatment need according to ICON score >43 was determined to be higher in the age group 18 year-olds. Overall, the tendency for orthodontic treatment complexity grade was observed to increase with the age.

Key words: severity of malocclusion, orthodontic treatment need, ICON (The Index of Complexity Outcome and Need)

INTRODUCTION

Global tendencies and paradigm shifts in clinical orthodontics point to the change in the age distribution and in the categories of individuals who receive the benefit from orthodontic treatment, such as the children and adolescents, as well as adults and even elderly patients with malocclusions [1; 2].

Changes in morphogenesis and physiology of dentofacial structure over time [3] and an increased concern for dental appearance and orthodontic treatment with age have become apparent rather than inadequate decisions and a provision of care during childhood and adolescence [4].

Orthodontic treatment in adults is seen to be more common in clinics, nevertheless the data of severity of malocclusion and the need of orthodontic treatment in the adult population are still insufficient. Most studies on the need for orthodontic treatment in Latvia [5] and in other countries have been conducted on groups of children and adolescents. In Latvia it would be especially important to study young and middle age groups as they are representing the generation that is about to leave the professional orthodontic care.

The present study is a part of the cross-sectional survey on oral health in randomly selected samples of age groups 12-13; 18 and 35-44 yr. old. The objective of this study was to assess and compare the severity of malocclusion and professionally defined need of orthodontic treatment in different age groups.

MATERIALS AND METHODS

The study sample was randomly selected based on the data from the Latvian Central Bureau of Statistics, targeted in accordance with age and encompassed 356 subjects. The size of the study population was calculated according to the age and gender distribution of individuals in the general population. Age distribution of study population described in Table 1.

The survey was carried out in seven urban and seven rural regions of Latvia. ICON score was used for the assessment of severity of malocclusion and orthodontic treatment need. Three calibrated examiners (AA; JP; IJ) screened all the subjects using the ICON. The Index of Complexity, Outcome and Need (ICON) has been developed based on the average opinion of 97 practising specialists orthodontists from nine countries and approved as being appropriate for the international use [6; 7; 8]. It is a single assessment method to quantify complexity, outcome and need of orthodontic treatment. The ICON consists of five components: the Aesthetic Component (AC), upper and lower crowding/spacing assessment,

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Table 1. Age distribution of the study population

Age groups	n	(%)
12-13	46	11.8
18	32	8.2
35-44	278	71.5
Total	356	

Table 2.1. Missing teeth in age group 35-44 yr.

Criteria	n	%
No more than 4 missing teeth	109	39.2%
Missing 5-8 teeth	96	34.5%
Missing 9-12 teeth	44	15.8%
More than 12 missing teeth	29	10.5%
Total	278	100

Table 2.2. Missing teeth with prosthetic restorations in age group 35-44 yr.

Criteria	n	%
No more than 4 missing teeth	31	25.6%
5-8 missing teeth	42	34.7%
9-12 missing teeth	28	23.2%
More than 12 missing teeth	20	16.5%
Total	121	100

Table 2.3. Missing teeth, without prosthetic restorations in age group 35-44 yr.

Criteria	n	%
No more than 4 missing teeth	78	49.7%
5-8 missing teeth	54	34.4%
9-12 missing teeth	16	10.2%
More than 12 missing teeth	9	5.7%
Total	157	100

Table 3. Distribution of mean ICON values by age group (≤4 missing teeth in age group 35-44)

Age group	ICON		n
	Mean	SD	
12-13	35.8*	15.97	46
18	39.9*	15.58	32
35-44	35.2	16.1	78

Statistical significance p<0.01

Table 4. Treatment need according to the ICON values

Age group	< 31		> 43	
	n	%	n	%
12-13	19	63.3	11	36.7
18	9	40.9	13	59.1
35-44	35	63.7	20	36.4

Statistical significance p<0.001

Table 5. Distribution of the complexity grade by age group (1= easy; 2=mild; 3=moderate; 4= difficult; 5= very difficult)

Age group	1		2		3		4		5	
	n	%	n	%	n	%	N	%	n	%
12-13	19	41.3	19	41.3	5	10.9	2	4.3	1	2.2
18	8	25.0	15	46.9	7	21.9	1	3.1	1	3.1
35-44	29	37.2	35	44.9	8	10.3	6	7.7	0	0.0

Statistical significance p<0.01

presence of a crossbite, degree of incisor open bite/over-bite, and the manner of fitting of the teeth in the buccal segment in terms of the anterior-posterior relationship. Each component was measured in all patients. The need for orthodontic treatment was defined as having an ICON score of 43 and greater. Severity of malocclusion was assessed by the following ICON score intervals: <29 light; 29-50 moderate, 51-63 middle, 64-77 severe, >77 very severe. ICON values score less than 31 were assessed as an acceptable occlusion without any need for orthodontic treatment.

In order to provide the accuracy use of ICON, more than 4 missing teeth and prosthetic restorations were chosen as an exclusion factor for the age group 35-44 years.

The possible reasons for the absence of these teeth were defined as: 1) severe caries; 2) due to trauma; 3) genetically missing. If the teeth had been extracted because of previous orthodontic treatment necessity, they were not included in this group.

The cuspal relationships were scored according to

the ICON protocol. Scoring zone included the canines, premolars and molar teeth. In case where 1 or 2 teeth were missing the worst score in terms of anterior posterior relationships were measured: in case of cusp to cusp relationship the score was – 2; in case of other cusp relationship up to – score 1.

Statistical analysis

The data were analyzed using descriptive and analytical methods for analysis. Mean values, SD of ICON values as well as proportion of individuals with different ICON scores were calculated for all age groups.

The proportion of subjects in different age groups with the need of orthodontic treatment and the proportion of subjects with a different severity of malocclusion were assessed using two-way and multi-way frequency tables. Statistical significance of differences in proportion was tested by means of Pearson χ^2 test. Mean values of ICON scores in different age groups were compared using ANOVA. Differences of mean ICON values between the age groups were tested using Bonferroni test for statistical significance.

RESULTS

In the assessment of the severity of malocclusion and need for orthodontic treatment among adults in the age group 35-44 years we faced the problem of a large

Table 6. Mean ICON values by age groups and gender

Age group	ICON			
	Males		Females	
	Mean	SD	Mean	SD
12-13	33.7	15.8	36.6	16.4
18	40.4	14.7	39.6	16.8
35-44	35.8	14.8	34.7	17.1

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number of missing teeth. Adults were divided according to the number of missing teeth to facilitate the screening process. (Tables 2.1; 2.2; 2.3.). Out of 278 adults in the age group 35-44 there were 78 individuals included with no more than 4 missing teeth. In adults the loss teeth most often was observed in buccal segments. Typically the first molars were missing and the second molars were tipped mesially. In some individuals premolars were found to be missing.

Since the proportion of individuals with previous orthodontic treatment was small (18% among 18 years old and 1.44% in age group 35-44) they were not excluded.

Mean values of ICON values in the age groups are presented in the Table 3.

Overall there was a statistically significant difference between the mean ICON values in all age groups. However, 1% significance level was observed only comparing the mean ICON values between the age groups 12-13 and 18.

The mean value in the age group 12-13 was 35.8, in the age group 18 it was the highest – 39.9 and in the age group 35-44 it was similar to the younger group – 35.2. (Table 3).

Professionally defined orthodontic treatment need according to the ICON value (with score >43) presented some significant differences between age groups. A larger proportion of the 18 year old group was determined to be in need of orthodontic treatment in comparison to the group 12-13 and 35-44 year olds (Table 4). The association expressing the orthodontic treatment need in the age groups was statistically significant (p<0.001).

Table 5 presents the distribution complexity of orthodontic treatment according to the age groups.

Majority of the individuals in the age group 12-13 years had a complexity grade easy and mild and only a small proportion of individuals had difficult complexity grade (Table 4.). In the age group of 18 years the majority of individuals had a complexity grade mild (46.9%), and easy and moderate complexity grade was observed respectively 1,8 and 2,1 times less frequently. Only a very small proportion of individuals in this age group had complexity grade – very difficult. In the adult group of 35-44 years, mild complexity grade was observed more often. It was followed by easy and moderate complexity grade and an increase by 7.7% with complexity grade difficult. There were no individuals in this age group with complexity grade – very difficult. The greatest number of individuals in all groups represented mild complexity grade of treatment. Overall the following relationship of statistical significance was observed: the number and severity of malocclusion are increasing with the age.

Overall there was a statistically significant difference of mean ICON values between both genders. However, no statistical significance was observed among different age groups between males and females (Table 6).

DISCUSSION

Most studies on severity of malocclusion and need for orthodontic treatment have been described regarding groups of children and adolescents. The need of professionally defined orthodontic treatment, assessed according to ICON (with score >43) in our study in the age group 12-13, was similar to the findings in other studies in Latvia [5] as well as in England and Wales [9;10;11;12]. Only few studies on orthodontic treatment need in young and middle age adult groups are available [13;14;15] and findings of studies between countries cannot be directly compared not only because of the difference in the assessment methods, but also due to the difference in the study design and the access to orthodontic treatment in public care system.

In our study the highest orthodontic treatment need was presented in the age group of 18 year olds. It could be explained by the lack of orthodontic treatment in childhood (previous treatment 18%), the development of skeletal discrepancies during growth or the relapse after orthodontic treatment.

However, a lower proportion of individuals with need for orthodontic treatment was observed in the age group 35-44, comparing to the age group 12-13 and 18 could be influenced by exclusion of subjects with more than 4 teeth missing in the age group of 35-44 years and this finding could not be referred to the overall sample. A significant difference in the age group is determined by the distribution of the complexity grade, where the tendency of severity of malocclusion to increase with age has been observed.

In UK and Norway studies where missing teeth were not the exclusion factor for the assessment of the severity of malocclusion, data for orthodontic treatment need in middle age adult group significantly differed.

In UK study the mean ICON values for 30-40 year old males was 58, 4 and for females 51, 8 [16] which was significantly higher if compared to our data in the age group 35-44.

In Norway, a professionally defined need for orthodontic treatment according to the NOTI (Need for Orthodontic Treatment Index) among 18 and 35 year olds was classified as larger proportion of the 35 year olds to be in need of treatment compared to the 18 year olds [14]. For the age group of 35 year olds, the treatment needs for orthodontically treated individuals were 35% and for orthodontically untreated this indicator was 37%. In our study following to ICON index in the age group of 35-44 year olds, orthodontic treatment need was quite similar 36,4%.

Taking into account the literature and present data, there could be a reason for the assumption that the severity of malocclusion and complexity of orthodontic treatment need is increasing with the age. Actually, it is necessary to do a more detailed investigation on the factors influencing the development of the severity of malocclusions and requiring an interdisciplinary approach of treatment on adults in future.

CONCLUSIONS

1. Orthodontic treatment need is considerably high in all age groups.
2. All groups presented mainly moderate severity of malocclusion what corresponds with mild complexity grade of orthodontic treatment.
3. Complexity grade or orthodontic treatment has tendency to increase with age.

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