Original article

Need for orthodontic treatment among children in Foča

Tanja Ivanović[1], Dragan Ivanović[1], Predrag Nikolić[2], Ljiljana Stojanović[2], Marina Milinković[1], Bojan Joksimović[1]

[1]Department of Pediatric and Preventive Dentistry with Orthodontics, Faculty of Medicine Foča, University of East Sarajevo, The Republic of Srpska, Bosnia and Herzegovina

[2]Department of Orthodontics, Faculty of Dental Medicine, University of Belgrade, Belgrade, Serbia

Summary

Introduction. Orthodontic treatment is a common dental procedure in developed countries. Assessment of orthodontic treatment need is important for health services planning and population trends monitoring. The aim of this study was to assess the need for orthodontic treatment among children in Foča, Bosnia and Herzegovina.

Methods. The study involved 81 students of two primary schools in the municipality of Foča, aged 11-13 years. The subjects underwent clinical examinations, the dental impressions were taken, study models were made and analyzed, and digital photographs of anterior dentition were taken too. Index of Complexity, Outcome and Need (ICON) was used to assess the need for orthodontic treatment. The number of orthodontists, which would be sufficient to meet the needs of this population of children, was estimated.

Results. ICON index results showed that 56.8% of children needed orthodontic treatment. There was no statistical significance in the need for orthodontic treatment between the subjects of different gender and age. The study showed that 22.2% of boys and 34.6% of girls needed orthodontic treatment. In relation to age, 21% of eleven- and 21% of twelve-year-olds needed orthodontic treatment and 14.8% of thirteen-year-olds. The incidence of crowding was 80.2%. Crossbite was present in 23.5% of examined students, open bite in 2.5%, deep bite in 29.6% and irregular dental esthetics anterior teeth in 28.4%. Class II/1 malocclusion was found in 39.5% of children, II/2 class in 9.9%, class I in 38.3%, while class III malocclusion was found in 9.9% of examined children.

Conclusion. The study shows that a large percentage of children in Foča need orthodontic treatment. Percentage of the need for orthodontic treatment is higher in comparison to most of the countries in Europe and the world. The development of prevention programs and early caries therapy can greatly reduce the need for orthodontic treatment.

Keywords: orthodontics, orthodontic treatment, ICON index, treatment need indices

Correspondence to:
Ivanović Tanja, DMD, MSc
Faculty of Medicine Foča,
Studentska 5, 73300 Foča
tanjadomazet@yahoo.com

Introduction

Assessment of orthodontic treatment need is important for population trends monitoring and health service planning that includes the planning of orthodontic specialists and support staff. Moreover, funding planning is important as well, and is considered as an important addition to available resources management.

In many countries, mainly Scandinavian, malocclusion and craniofacial malformations are considered as national health problems and orthodontic services are financed by the state. In other countries, health insurance plans created limited fees for orthodontic treatment. This situation and the fact that demand for orthodontic treatment cannot always be met due to lack of staff, have created an urgent need for the establishment of health services planning organization [1].

Epidemiological indices are used to assess orthodontic treatment need with normative and clinical point of view. They are used for objective assessment of orthodontic treatment need and their use contributes to decision making on priorities in patients who need the orthodontic treatment. Indices have been in use for many years in countries where dental health care is financed by the state, unlike the countries where dental health care is not funded by the state and indices utilization is limited. Several indices have been used for the assessment of the need for orthodontic treatment: Index of Orthodontic Treatment Need (IOTN), Dental Aesthetic Index (DAI), Index of Complexity, Outcome and Need (ICON) [2]. ICON index was developed in order to determine the complexity and results of treatment as well as the orthodontic treatment need. It is an internationally accepted index, easy to use, fast and valid.

Improvement of oral health, dental esthetics, occlusal function and psychosocial aspects of oral health justify the assessment of orthodontic treatment need. Orthodontic anomalies are related to psychosocial diseases [3,4], periodontal diseases [5], poor masticatory function [6] and represent a significant health problem. Assessment of the malocclusion severity and the need for treatment is not always easy and is dependent on many factors: age, gender, dentition, knowledge and experience of the orthodontist as well as financial status of patients. Esthetics is one of the most important factors for patients seeking orthodontic treatment. The importance of esthetics is emphasized by the esthetic component of the occlusal indices: IOTN index and ICON index. Patient's observation of own malocclusion is often contrary to the objective character of malocclusion. Orthodontics is a discipline that provides an opportunity for children to have a safe smile and functional occlusion that improves their quality of life.

The World Health Organization (WHO) reported in 1985 that 21% to 64% of children aged 13 and 14 years should have orthodontic treatment [7]. Studies that have assessed the orthodontic treatment need were carried out in Latvia [8], France [7], Italy [9], Sweden [10], Bosnia and Herzegovina [11].

The aim of the study was to determine the need for orthodontic treatment, as well as a sufficient number of orthodontic specialists.

Methods

This epidemiological study involved 81 students, aged 11-13 years, from the elementary schools in the municipality of Foča, who did not have a history of orthodontic treatment. Dental examinations were performed under daylight, using dental mirror and probe in school health centers. Students' teeth were fingerprinted in order to create study models and anterior dentition photographs were taken. Study casts were analyzed according to the protocol ICON index. ICON index was used to assess the need for orthodontic treatment. It is composed of five components: dental esthetics, space in the upper jaw (crowding and spacing), crossbite, deep/open bite and occlusion according to Angle. The need for orthodontic treatment was defined as having an ICON score of 43 and greater.

The study was approved by the Institutional Ethics Committee (N0: 01-8/61 issued on 24 December 2009) and was conducted in

accordance with the Helsinki Declaration of 1975, as revised 1983. The written consent of the Director of the school and parental consent for participation in the study were obtained.

The number of specialists in orthodontics, sufficient for the treatment needs of the population studied, was estimated. Considering that each specialist can provide 1400 hours of treatment per year, the number of orthodontists was calculated as the quotient of the total need for specialized treatment in the hours and the total number of hours of treatment per year. The total demand for specialist treatment in hours was calculated as the product of secondary treatment time per patient per year and the total number of children who need specialist treatment. An average patient treatment per year was 3.5 hours [1].

Statistical analysis was performed in SPSS 11.5. The results were presented as frequencies and significance of the differences between analyzed groups was determined by χ2 test.

Results

This study involved 81 subjects, aged 11-13 years, 43.2% boys and 56.8% girls. Among them, 34.6% were 11 years old, 34.6% were 12 and the remaining 30.9% were 13 years old (Table 1).

Results of the study showed that 56.8% of students need orthodontic treatment. There was no statistical significance in the need for orthodontic treatment between students of different age and gender (Table 1).

According to the results obtained one orthodontist is enough for the treatment of this study population group. However, considering other age groups of patients as well as new generations, only one specialist in the field of orthodontics is not enough for the treatment needs of the whole population of elementary school students.

Table 2 shows that 17.3% of children had spaced teeth. The incidence of crowding was 80.2%. Crossbite was present in 23.5% of examined students, open bite in 2.5%, deep bite in 29.6% and irregular dental esthetics anterior teeth in 28.4%.Out of all examined children, II/1 class malocclusion was found in 39.5% of patients, II/2 class in 9.9%, class I in 38.3%, while class III malocclusion was found in 9.9% (Table 2).

Table 2. Frequency of orthodontic abnormalities

Orthodontic abnormalities	Number (%)
Spacing	14 (17.3)
Crowding	65 (80.2)
Crossbite	19 (23.5)
Bite	
Open bite	2 (2.5)
Deep bite	24 (29.6)
Irregular dental esthetics	23 (28.4)
Malocclusion	
Class I	31 (38.3)
Class II/0	2 (2.5)
Class II/1	32 (39.5)
Class II/2	8 (9.9)
Class III	8 (9.9)

Table 1. The need for orthodontic treatment (ICON index) according to gender and age of subjects

Characteristics	Need for orthodontic treatment		Total	χ^2	p
	yes	no			
Gender					
Boys	18 (22.2)	17 (21.0)	35 (43.2)	0.722	0.395
Girls	28 (34.6)	18 (22.2)	46 (56.8)		
Age (years)					
11	17 (21.0)	11 (13.6)	28 (34.6)		
12	17 (21.0)	11 (13.6)	28 (34.6)	1.139	0.566
13	12 (14.8)	13 (16.0)	25 (30.9)		
Total	46 (56.8)	35 (43.2)	81 (100)		

Data are presented as numbers (%)

Discussion

ICON is a relatively new index and its increasing use is imminent. Reliability and validity of the ICON index to assess the need for orthodontic treatment was confirmed by Firestone et al. [12]. Đorđević et al. [13] confirmed the validity and reliability of the three occlusal indices need for orthodontic treatment in Serbia: Index of Orthodontic Treatment Need (IOTN), Peer Assessment Rating Index (PAR), and the Index of Complexity, Outcome and Need (ICON).

This is the first epidemiological study of malocclusion based on ICON index in Bosnia and Herzegovina. The use of the index for assessment of the need for orthodontic treatment and diagnosis of malocclusion is of a great importance not only for revealing the prevalence of malocclusion but also for planning of preventive measures. Results of the present study showed that 57% of examined students needed orthodontic treatment. A high percentage of orthodontic problems is associated with poor oral hygiene, caries and premature loss of primary teeth. Results of the study conducted by Davidović et al. [14], who used Klein-Palmer DMFT system (D-Decayed, M-Missing, F-filled) to estimate the prevalence of dental caries in the group of children of 12 and 15 years of age in the municipality of Foča, Kalinovik and Čajniče, showed that the average DMF teeth index was 6.17 in all patients, while in the group of 12-year-olds it was 5.64. Džemidžić et al. [11] examined children aged 12 and 14 years using Dental Health Component of IOTN and reported that 53.5% of them needed orthodontic treatment, similarly to our results. They also found no statistically significant difference between the genders. Liepa A et al. [8] found that 35.3% of children in Latvia needed orthodontic treatment, which is less in comparison with the results of our study. They found no statistically significant difference between the genders, which is in concert with the results presented here. Baubinie and collaborators [15] showed that almost half of the children in Lithuania (49.6%), aged 10 and 11 years needed orthodontic treatment, while every third child, aged 14 and 15 years needed

this treatment (34.1%), which is less compared with the results of our study.

Most of the studies assessed orthodontic treatment need using IOTN index. Souames et al. [7] found that 21.3% of children in France needed orthodontic treatment, 28.6% were borderline cases; and 50.1% of children did not need orthodontic treatment. There was no a statistically significant difference in relation to gender, which coincides with the results of this study. Similar results were obtained in Italy [9], Northern Ireland [16] and Spain [17].

Based on a sample of 1.050482 subjects aged 7 to 16 years, S Linder- Aronson [1] reported that the overall need for specialized treatment could be met by 488 specialists in orthodontics in Sweden. Rashed Al-Azemi and coworkers [18] assessed the need for orthodontic treatment in Kuwait and reported that 30% of adolescents needed treatment, but 50-60 specialists in orthodontics could meet the needs for treatment of tested population. Also, orthodontic treatment need in Teheran was less as compared to most countries in Europe [19]. Research in Albania [20] showed that 41.2% of respondents had the need for orthodontic treatment, which is more than in most European countries, and less in comparison with the results of our study.

In the municipality of Niš, Serbia, Janošević et al. [21] found that orthodontic treatment need was similar to those in most European countries, but less than that found in our study (27.4% of children had great, 41.0% moderate and 31.6% light or no treatment need according to DHC IOTN index).

Conclusion

A high percentage of children in Foča need orthodontic treatment, approximately every second child. One orthodontist is enough to meet the need for orthodontic treatment of the study population group. Considering other age groups of patients as well as new generations, one orthodontist will not be able to meet the needs of all groups of children and adults.

The authors declare no conflicts of interest.
Autori izjavljuju da nemaju sukob interesa.

References

1. Linder-Aronson S. Orthodontics in the Swedish Public Dental Health Service. Eur J Orthod 2007;29(suppl 1):124–7.

2. Daniels C, Richmond S. The development of the Index of Complexity, Outcome and Need (ICON). J Orthod 2000;27(2):149–62.

3. Gray MM, Bradnock G, Gray HL. An analysis of the qualitative factors which influence young people's acceptance of orthodontic care. Prim Dent Care 2000; 7(4):157–61.

4. Shaw WC. Factors influencing the desire for orthodontic treatment. Eur J Orthod 1981;3(3):151–62.

5. Ngom P, Diagne F, Benoist H, Thiam F. Intraarch and interarch relationship of the anterior teeth and periodontal conditions. Angle Orthod 2006;76(2):236–42.

6. Ngom P, Diagne F, Aidara- Tamba A, Sene A. Relationship between orthodontic anomalies and masticatory function in adult subjects. Am J Orthod Dentofacial Orthop 2007;131(2):216–22.

7. Souames M, Bassignz F, Zenati N, Riordan PJ, Boy-Lefevre ML. Orthodontic treatment need in French schoolchildren: an epidemiological study using the Index of Orthodontic Treatment Need. Eur J Orthod 2006;28(6):605–9.

8. Liepa A, Urtane I, Richmond S, Dunstan F. Orthodontic treatment in Latvia Eur J Orthod 2003;25(3):279–84.

9. Perillo L, Masucci C, Ferro F, Apicella D, Baccetti T. Prevalence of orthodontic treatment need in Southern Italian schoolchildren. Eur J Orthod 2010;32(1):49–53.

10. Josefsson E, Bjerklin K, Lindsten R. Malocclusion frequency in Swedish and immigrant adolescents-influence of origin on orthodontic treatment need. Eur J Orthod 2007;29(1):79–87.

11. Džemidžić V, Tiro A, Redžepagić VL, Nakaš E. Potreba za ortodontskim tretmanom kod učenika u dobi između 12 i 14 godina u Bosni i Hercegovini. Acta Stomatologica Croatia 2012;46(2):105–10.

12. Firestone AR, Beck FM, Beglin FM, Vig KW. Validity of the Index of complexity, outcome, and need (ICON) in determining orthodontic treatment need. Angle Orthod 2002;(1)72:15–20.

13. Đorđević J, Šćepan I, Glišić B. Procena saglasnosti i korelacija tri okluzalna indeksa u određivanju potrebe za ortodontskim lečenjem. Vojnosanit Pregl 2011;68(2):125–9.

14. Davidović B, Ivanović M, Janković S. Dental Health estimation for children age twelve and fifteen. Stom Glas 2012;59(1):35–43.

15. Baubiniene D, Šidlauskas A, Misevičiene I. The need for orthodontic treatment among 10-11- and 14-15-year-old Lithuanian schoolchildren. Medicina (Kaunas) 2009;45(10):814–21.

16. Burden DJ. Need for orthodontic treatment in Northern Ireland. Community Dent Oral Epidemiol 1995;23(1):62–3.

17. Manzanera D, Montiel-Company JM, Almerich-Silla JM, Gandia JL. Orthodontic treatment need in Spanish schoolchildren: an epidemiological study using the Index of Orthodontic Treatment Need. Eur J Orthod 2009;31(2):180–3.

18. Al-Azemi R, Artun J. Orthodontic treatment need in adolescents Kuwaitis: prevalence, severity, and manpower requirements. Med Princ Pract 2010;19(5):348–54.

19. Jamilion A, Darnahal A, Damani E, Talaeipour M, Kamali Z. Prevalence of orthodontic treatment need and occlusal traits in children. Int Sch Res Notices 2014 Oct 28;2014:349793. doi: 10.1155/2014/349793.

20. Lagana G, Masucci C, Fabi F, Bollero P, Cozza P. Prevalence of malocclusions, oral habits and orthodontic treatment need in a 7-to15-year-old schoolchildren population in Tirana. Prog Orthod 2013;14:12.

21. Janošević P, Stošić M, Janošević M, Radojičić J, Filipović G, Čutović T. Index of orthodontic treatment need in children from the Niš Region. Vojnosanit Pregl 2015;72(1):12–5.

Potreba za ortodontskim liječenjem kod djece u Foči

Tanja Ivanović[1], Dragan Ivanović[1], Predrag Nikolić[2], Ljiljana Stojanović[2],
Marina Milinković[1], Bojan Joksimović[1]

[1]Katedra za dječiju i preventivnu stomatologiju sa ortodoncijom, Medicinski fakultet, studijski program stomatologija, Univerzitet u Istočnom Sarajevu, Foča, Republika Srpska, Bosna i Hercegovina
[2]Katedra za Ortopediju vilice, Stomatološki fakultet, Univerzitet u Beogradu, Beograd, Srbija

Uvod. Ortodontski tretman je uobičajena stomatološka procedura u razvijenim zemljama. Mjerenje potrebe za ortodontskim tretmanom je važno za planiranje zdravstvenih usluga i praćenje populacionih trendova. Cilj studije je procijeniti neophodnost ortodontskog tretmana kod djece u Foči, Bosna i Hercegovina i odrediti broj ortodonata koji će zadovoljiti potrebe liječenja ispitivane populacije.

Metode. U studiji je učestvovao 81 učenik dvije osnovne škole u opštini Foča, uzrasta 11-13 godina. Ispitanicima je urađen klinički pregled, uzeti su otisci zuba u alginatu, napravljeni i analizirani studijski modeli i kolor digitalne fotografije anteriorne denticije. Index of Complexity, Outcome and Need (ICON) je korišćen za mjerenje potrebe za ortodontskim tretmanom. Procijenjen je i broj ortodonata koji je dovoljan da zadovolji potrebe ove populacione grupe djece.

Rezultati. ICON skorovi su pokazali da 56,8 % djece treba ortodontski tretman. Nije nađena statistički značajna razlika u potrebi za ortodontskim tretmanom između djece različitog pola i uzrasta. Ortodontsko liječenje treba 22,2% dječaka i 34,6% djevojčicaa. U odnosu na godine 21,0% jedanaestogodišnjaka, 21,0% dvanaestogodišnjaka i 14,8 % trinaestogodišnjaka treba ortodontski tretman. Potrebu liječenja u ispitivanoj populacionoj grupi djece može da zadovolji jedan specijalista ortodoncije.

Zaključak. Studija pokazuje da veliki procenat djece u Foči treba ortodontski tretman. Procenat potrebe za tretmanom je veći u odnosu na većinu zemanja Evrope i svijeta. Razvoj preventivnih programa i rana terapija karijesa mogu u velikoj mjeri da smanje potrebu za ortodontskim tretmanom.

Ključne riječi: ortodoncija, ortodontski tretman, ICON indeks, indeksi potrebe tretmana