

THE DETERMINATION OF THE NEED TO PROVIDE ORTHODONTIC ASSISTANCE TO TEENAGERS IN CONDITIONS OF LIMITED RESOURCES

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ABSTRACT

The aim: To substantiate the need for a combination of interdisciplinary approaches to diagnosis, treatment and correction of dento-maxillofacial anomalies of teenagers based on the analysis of the need for orthodontic treatment using the DAI, IOTN, ICON aesthetic indices.

Materials and methods: Empirical, epidemiological, clinical, analytical-synthetic, sociological, psychological research methods, questionnaires, dental indexes have been used in various combinations.

Results: As a result of a clinical examination of 2,260 teenagers (1,096 boys and 1,124 girls), 1,474 individuals have been selected for orthodontic treatment with the following degree of complexity: mild – in 25 examined (35.71±4.95%), moderate – in 31 individuals (44.28± 5.48%), heavy – 14 (20.00±3.11%). After an in-depth dental examination and determination of the psychological profile, 70 teenagers have been selected for treatment.

Conclusions: The effectiveness of the use of dental indices as a screening tool to eliminate the discrepancy between objective medical indicators of the level of need for correction of dento-maxillofacial anomalies and the level of expected results in adolescents has been proven.

KEY WORDS: dentistry, orthodontic treatment, index of need for orthodontic treatment, DAI, IOTN, ICON

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INTRODUCTION

Global trends to reduce spending on the health care system encourage optimization of the processes of correction and treatment of dento-maxillofacial pathologies. In the conditions of limited material, labor and financial resources, the search for effective methods of orthodontics is becoming more urgent, because the treatment and correction of dento-maxillofacial anomalies is one of the resource-intensive types of dental work.

The result of orthodontic care depends on the quality of diagnosis and the clinic. Since not every malocclusion requires treatment, a comprehensive approach to predicting the course of the treatment process requires finding new ways of patient-doctor interaction. The use of dental indexes in combination with psychosociological methods will allow to identify patients who have a priority need for treatment, will contribute to the effectiveness of orthodontic treatment.

The peculiarities of mental development of teenagers [1] demand to single out this category of patients as the most vulnerable due to their tendency to psychological accentuations caused by sensitivity to their own appearance, social image attributes [2].

THE AIM

The aim of the research is to substantiate the need for a combination of interdisciplinary approaches to diagnosis, treatment and correction of dento-maxillofacial anomalies of teenagers based on the analysis of the need for orthodontic treatment using the DAI, IOTN, ICON aesthetic indices.

MATERIALS AND METHODS

Dental examinations of 2,260 teenagers in the age group 14-17 years old with a fully formed permanent bite have been carried out on the basis of the examination dental office of the polyclinic department of Uzhgorod City Children's Hospital by a multidisciplinary team of specialists (orthodontist, pediatrician, psychologist, teacher) from among students of general secondary education institutions of Uzhgorod. The level of need for orthodontic treatment of teenagers has been determined. In the selected group of 570 respondents (230 parents and 340 children), relationships between dental competence, conditions of socio-hygienic functioning, and level of dental health have been revealed. A group of 70 (-2) people has been selected for treatment.

Table I. Division of patients of the studied group according to the indicator of the complexity of orthodontic treatment of the ICON index

Level of complexity of orthodontic treatment		Abs.	%
Very light	<29 scores	-	-
Light	29 till 50 scores	25	35,71±4,95
Moderate	51 till 63 scores	31	44,28±5,48
Difficult	64 till 77 scores	14	20,00±3,11
Very heavy	>77 scores	-	-

Table II. Evaluation of the results of treatment by the level of improvement of the ICON index of the ICON index

Level of improvement (assessment before treatment - 4 x assessment after treatment)	Scores
A substantial improvement	>-1
A significant improvement	-25 till -1
Moderate improvement	-53 till -26

Table III. Division of patients according to the level of discrepancy between the levels of self-esteem and harassment in groups with different level of complexity of orthodontic treatment according to the ICON index

Level of complexity of orthodontic treatment	The level of difference between the levels of self-esteem and harassment					
	Light < 8 scores		Moderate 9-25 scores		Heavy > 26 scores	
	Abs.	%	Abs.	%	Abs.	%
Light N=25	3	12,0±1,26	18	72,00±4,26	4	16,00±3,11
Moderate N=31	5	16,12±1,85	20	64,51±4,09	6	19,35±3,68
Heavy N=14	-	-	11	78,57±5,11	3	21,42±4,09

Clinical research methods have been used to assess the state of the dento-maxillofacial system and the results of orthodontic treatment; epidemiological methods, x-ray, photometry, dental indices – for diagnosing the condition of the dento-maxillofacial system, evaluating the results of treatment; psychological – to assess the psycho-emotional state and level of quality of life of patients with dento- dento-maxillofacial anomalies; sociological – establishment of relationships between conditions of social and hygienic functioning and motivation for orthodontic treatment; statistical – to establish the levels of correlation, data dispersion, levels of consistency of the obtained results and verify the reliability of established dependencies and associations.

RESULTS

The analysis of the need for orthodontic treatment on a sample of 2,260 teenagers, students of educational institutions aged 14 to 17 years, according to the DAI indices, the dental health components of the IOTN and ICON indices, shows the need for treatment in 54.51±4.90%, 52.16±1.52% and 51.94±3.18% of the examined, respectively. Partial secondary adentia is the indication for orthodontic treatment in 18.58±1.21% of the examined persons. It is caused by the removal of

permanent teeth as a result of complicated caries, which is a specific risk factor in the occurrence and progression of dentition deformations.

The analysis of the aesthetic component of the IOTN and ICON indices shows that 31.74% of the examined consider themselves to be in need of orthodontic treatment. When analyzing the structure of the subjective need for orthodontic treatment according to the aesthetic component of the IOTN, a high degree of need for treatment has been found in 4.22±0.58% of the examined. Although according to the dental component of the same index, this indicator is 8.93±0.71%, and according to the DAI index – 9.33±1.47%, which indicates a lack of awareness of the presence in patients of a particularly complex clinical form of dento-maxillofacial anomalies and accordingly, low motivation to receive medical care.

The analysis of the medical and social component of the need for orthodontic treatment based on a questionnaire of teenagers and their parents or guardians proved the urgent feasibility of increasing the importance of orthodontic treatment of teenagers in the Transcarpathian region, by objectifying the problem and increasing the motivation to carry out this treatment (36.20% of parents do not understand the essence of orthodontic treatment; 3.44% associate the successful future of their children with a beautiful smile; 6.89% are

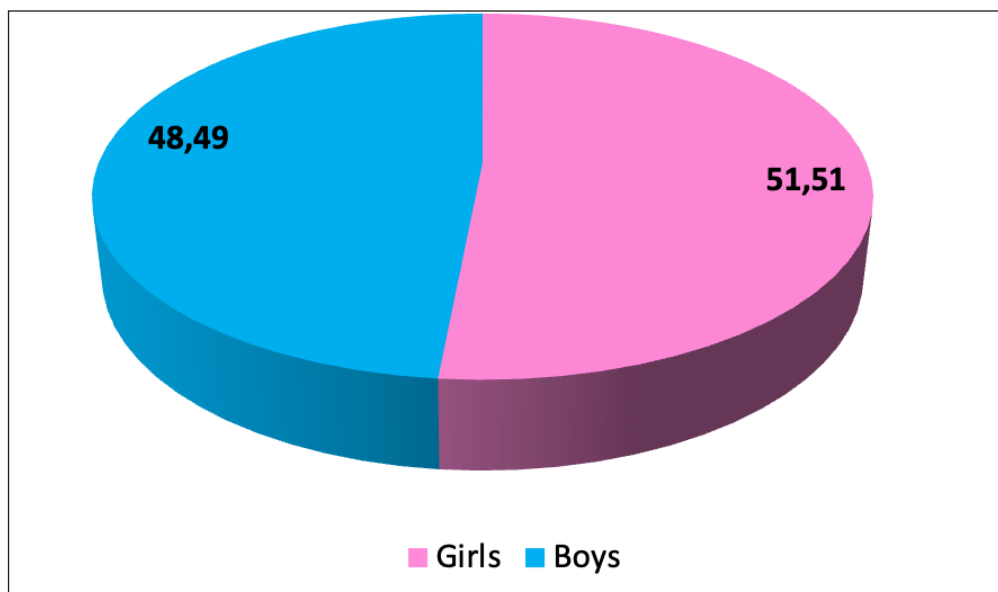


Fig.1. Division of the researched persons by gender at the first stage of the study

aware of the impact of orthodontic pathology on the child's psychological comfort).

As a result of an in-depth dental examination and determination of the psychological profile, 70 teenagers have been selected for orthodontic treatment with the use of non-removable equipment (bracket-system examination, average positive correlations have been determined between the indicator of the degree of complexity of orthodontic treatment according to the ISON index, the level of self-esteem and harassment according to the Dembo-Rubinstein scale, reactive anxiety ($r=0,45$; $p<0,05$) according to the Spielberger scale, the OHIP-14-RU scales "disruption of masticatory function" ($r=0,48$; $p<0,05$), "physical pain" ($r=0,57$; $p<0,05$), "psychological discomfort" ($r=0,45$; $p<0,05$), "social disability" ($r=0,62$; $p<0,05$).

Thus, orthodontic treatment eliminated the morphological basis of physical discomfort and had a positive effect on the psycho-emotional condition of patients. Patients with low self-esteem and a low level of harassment, patients with overestimated self-esteem against the background of an inappropriate level of harassment, teenagers with a high level of personal and reactive anxiety, demonstrate indicators for predictably complex and long-term orthodontic treatment with the need for a high level of responsibility and cooperation with the doctor, they need psychological training with the involvement of specialists.

Dento-maxillofacial anomalies in teenagers cause deterioration of dental health in general, requiring significant medical and economic resources. According to studies [3, 4], the prevalence of dento-maxillofacial anomalies in the structure of dental morbidity ranks second after dental caries and is from 30.0% to 82.0% in the world population with a tendency to increase in adverse environmental conditions [5]. In different regions of Ukraine, studies [6, 7] testify the prevalence of dento-maxillofacial anomalies

and deformities in 75-90%. children and teenagers. In the Transcarpathian region, dental pathologies increase as a result of biogeochemical deficiency of trace elements, especially fluorine, iodine, calcium, magnesium in the environment [8-10].

In the conditions of limited resources against the background of the high prevalence of orthodontic pathologies, it is significant to take into account a wide range of tools that have a positive effect on the effectiveness of treatment, in particular, dental indices and psychosociological diagnostic methods as a screening tool for determining priority areas of treatment.

The dental indices recommended by the WHO, such as the Index of Orthodontic Treatment Need (IOTN), The Dental Aesthetic Index (DAI) to determine the need or priority of orthodontic treatment, ranking the need for corrective measures from "no need" or "little need" to "necessary treatment" have been considered as diagnostic tools [10].

DAI (The Dental Aesthetic Index) is one of the most widely used indices, which is calculated exclusively on the basis of clinical signs of pathology in the oral cavity, without taking into account its external manifestations and the self-esteem of a person. Data from the IOTN (Index of Orthodontic Treatment Need) esthetics and orthodontic treatment needs index can also be used. At the same time, DAI is used to determine the normative need for treatment, and AC-IOTN is used to determine the perceived need (Spalj S. et al., 2014). The use of the ICON index is convenient for comprehensive assessment of the need, complexity and result of orthodontic treatment.

The following research stages has defined:

The first stage (2016-2017) – diagnosis of the need for orthodontic treatment based on the principle of multi-stage selection using continuous and selective research with various combinations of clinical and psychosociological methods;

II stage (2018-2020) – orthodontic treatment and removal of fixed orthodontic appliances using clinical and paraclinical methods;

Stage III (2021) – a comprehensive evaluation of the results of correction of anomalies of the orthodontic system, which included clinical and radiological examination, photometry and psychodiagnostics, the ICON for the aesthetic assessment of orthodontic treatment, statistical processing of the obtained data.

At the 1st stage of the study, a multidisciplinary team of specialists (orthodontist, pediatrician, psychologist, teacher) examined teenager patients with a fully formed permanent bite on the basis of the examination dental office of the polyclinic department of the Uzhhorod City Children's Hospital under artificial lighting using a standard set of tools: a mirror, a probe, tweezers. The examination of the patient began with the clarification of complaints and desired changes in the dento-maxillofacial system.

During the external examination, the relative proportionality and symmetry of the face, the expressiveness of the nasolabial and chin folds, the anatomy of the smile have been examined. When studying the dentition, the number of teeth, their shape, size, state of hard tissues, position in the dentition have been taken into account. The shape and size of the dental arches, their relation to the alveolar processes and the apical bases of the jaws have been determined. The ratio of tooth rows in the sagittal, transverse and vertical planes has been studied. Dento-maxillofacial anomalies have been diagnosed according to the International Classification of Diseases X revision as well as Engel's classification of dento-maxillofacial anomalies.

The need for orthodontic treatment has been determined by calculating the DAI, IOTN and ICON indices.

2,260 people have been examined, among them 1,096 boys and 1,124 girls.

Evaluating the psychosociological type of the patient's personality, the stereotype of family upbringing and the level of complexity of the future treatment, it is possible to predict the degree of cooperation of the patient with the doctor. Patients with low self-esteem and a low level of harassment, patients with overestimated self-esteem against the background of an inappropriate level of harassment, adolescents with a high level of personal and reactive anxiety, especially those who demonstrate indicators for predictably complex and long-term orthodontic treatment with the need for a high level of responsibility and cooperation with the doctor need psychological training with the involvement of specialized specialists. In some cases, it is even recommended to postpone the start of orthodontic treatment during a course of psychological consultations until the patient realizes the need for treatment, overcomes the difficulties associated with it, and completes the treatment. In these cases, longer psychological preparation of the patient and his parents is required.

At the II stage of the study, orthodontic treatment has been carried out. 70 teenagers underwent an in-depth orthodontic examination, X-ray examinations (orthopantomogram and telerradiography), photometry before fixation of non-removable orthodontic structures (bracket systems).

During the first week, 2 patients refused treatment, 68 patients with a brace system have been also asked to fill out questionnaires about their pain sensations, which also allowed to assess the level of adaptation to orthodontic treatment.

In order to identify correlations between the level of complexity of orthodontic treatment, psychological profile and quality of life, patients have been divided into groups according to the degree of complexity of the predicted orthodontic treatment according to the ICON index (Table I).

At the II stage of the study, after the end of orthodontic treatment (the duration of treatment was from 1.5 to 2.0 years) and the dismantling of fixed orthodontic equipment for the patients of this group, a comprehensive assessment of the results of the correction of anomalies of the lower jaw has been carried out. It included clinical, radiological examination, photometry and psychodiagnostic research methods, as well as determination of the ICON index, namely the component of the aesthetic assessment of the result of orthodontic treatment by the degree of improvement: significant, significant or moderate (Table II).

Sociopsychological diagnosis was carried out before the beginning and after the end of orthodontic treatment independently and as a component in determining the integrative indicator of the patient's degree of adaptation to fixed orthodontic equipment and risk factors for maladaptation at the stages of orthodontic treatment, such as pain and emotional stress.

The diagnostic value for assessing the quality of cooperation with the patient is the ratio of the level of self-esteem to the level of harassment, which forms a complex of central personality phenomena, determines its development and acts as a regulator of human activity. Disharmony arising due to unresolved contradictions between these components, inadequacy or instability of at least one of them, leads to internal and external conflicts, is a prerequisite for frustration and neurotic personality development (Table III).

DISCUSSION

Orthodontic treatment, improving the aesthetics of the smile and face, has a positive effect on the psycho-emotional state, which is expressed in reducing reactive anxiety, normalizing self-esteem, thereby normalizing the psycho-emotional background and adaptive capabilities of patients. The improvement of aesthetic characteristics, as well as the elimination of the morphological basis of physical discomfort after the end of

orthodontic treatment, contributes to the achievement of psychological comfort and helps to direct the focus of patients' attention to the establishment and maintenance of social contacts, which coincides with the results of scientific research in psychology [1; 2].

The doctor's knowledge of the essence and mastery of the basics of psychodiagnostics, such as a comprehensive measurement of the level of self-esteem and harassment, assessment of personal and reactive anxiety, will allow to bring work with the patient to a qualitatively new level, understand and predict possible ways of interaction with the patient, determine management tactics, and, if necessary, involve in joint treatment of additional specialists of a psychotherapeutic profile. When planning treatment, it is necessary to take into account a complex of factors affecting the course of orthodontic intervention. Evaluating the patient's personality type, the stereotype of family upbringing and the level of complexity of the future treatment, it is possible to predict the degree of cooperation of the patient with the doctor.

Patients with low self-esteem and a low level of harassment, patients with overestimated self-esteem against the background of an inappropriate level of harassment, adolescents with a high level of personal and reactive anxiety, especially those who demonstrate indicators for predictably complex and long-term orthodontic treatment with the need for a high level of responsibility and cooperation with the doctor need psychological training with the involvement of specialized specialists. In some cases, it is even recommended to postpone the start of orthodontic treatment during a course of psychological consultations until the patient realizes the need for treatment, overcomes the difficulties associated with it, and completes the treatment. In these cases, longer psychological preparation of the patient and his parents is required.

CONCLUSIONS

On the basis of provided research, it has been concluded that in the conditions of limited medical and

economic resources, it is advisable to combine interdisciplinary approaches for diagnosis, treatment and correction of dento-maxillofacial pathologies. The need to take into account the influence of a complex of medical, psychological, and social factors on the quality of orthodontic treatment of teenagers has been revealed. Data on the psychological state of a patient with a dento-maxillofacial anomaly, taking into account the influence of regional socio-cultural features, will allow to individualize specialized care and avoid possible complications at all stages of orthodontic treatment.

The effectiveness of using dental indices as a screening tool to eliminate the discrepancy between objective medical indicators of the level of need for correction of dento-maxillofacial anomalies and the level of expected results due to the age-related sensitivity of adolescents to their own appearance has been proven. The results of diagnostics using dental indices DAI, IOTN, ICON convince of the need to introduce aesthetic indices into the everyday practice of an orthodontist to determine the need for orthodontic treatment, the feasibility of correcting anomalies, and objectifying treatment results. The novelty of increasing the effectiveness of orthodontic treatment by means of an index assessment of indicators of the need and results of correction of dento-maxillofacial anomalies using methods of determining the psychosocial profile of an adolescent patient.

The proposed system of planning and organizing orthodontic care does not require significant additional resources, but it contributes to an individualized approach to working with the patient and improving the quality of its provision, which will allow the creation of a common database at the state level in the future. Such a database will provide an opportunity to share experience, develop new methods of orthodontic care, and evaluate treatment results.

The prospects for further work in the context of the conducted research can be seen in the development of protocols for standardizing diagnosis and providing orthodontic care to adolescent patients using sociopsychological methods.

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The Authors declare no conflict of interest.

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