

Prevalence of risk factors for the occurrence of orthodontic pathology among children in the city of Poltava: regional features

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ABSTRACT

Aim: The aim of our research was to investigate the regional features of the prevalence of risk factors for the occurrence of orthodontic pathology among the children's population of Poltava.

Materials and Methods: sociological, forecasting, bibliseomatic, analytical, medical-statistical. Materials: results of examination by a pediatric dentist of schoolchildren of different age groups (406 children), results of a questionnaire of parents of examined schoolchildren of different age groups (406 respondents).

Results: In our study, using the method of simple logistic regression, regional features of the prevalence of risk factors associated with the occurrence of orthodontic pathology were identified: the chances of detecting orthodontic pathology increase with the use of a pacifier, somatic morbidity in the first year of life (dysbacteriosis, rickets), the presence of caries in the child (complicated caries), the removal of permanent teeth due to caries, concomitant diseases (otorhinolaryngological pathology) in the child, the presence of heredity (orthodontic pathology in the family), and occupational hazards during the mother's pregnancy.

Conclusions: The identified risk factors for orthodontic pathology are mostly modifiable, that is, they are amenable to correction. Therefore, it is extremely necessary for pediatricians, family doctors and pediatric dentists to carry out both preventive measures to prevent the negative impact of these factors, and explanatory work with parents of children, who must be aware of the importance and necessity of prevention.

KEY WORDS: children, orthodontic pathology, risk factors, prevalence, regional characteristics

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INTRODUCTION

The modern increase in the pace of life, urbanization, decreased quality of nutrition, increased stress, and deterioration of the environment affect the morbidity of the population, especially the health of the child population [1-6]. The health of children and adolescents, including dental health, is one of the most sensitive indicators that reflect the socio-economic situation in Ukraine, the state of the environment, and is an indicator of the well-being of society as a whole. The high level of dental morbidity in the pediatric population has remained one of the current medical problems for many years; in different age groups, the incidence of caries, periodontal diseases, and disorders of tooth development and formation has been steadily increasing, which has a negative impact on the health of the child [7].

Analysis of epidemiological data [1, 3, 8-11] on the prevalence of dental diseases in Ukraine showed a negative trend in the growth of dental pathology: 67.8–77.4% of children aged 12 had carious lesions of per-

manent teeth, with CFE = 4.3–5.6 teeth; in 15-year-old children, the prevalence of caries was 75.2–88.1% with CFE = 4.3–5.2 teeth. The prevalence rates of dentofacial anomalies (DFA) were also very high: 58.9–70.2% of 12-year-old children and 23.6–33.7% of 15–17-year-old children required urgent orthodontic treatment [9, 12-14]. Morphological disorders in the dentofacial region in children were most often combined with functional speech disorders (15.6–17.2%), swallowing disorders (24.5–25.4%), nasal breathing disorders (36.7–37.3%), and chewing disorders.

Modern science explains these trends by the action of very stable and practically unchanging pathogenetic factors: dangerous environmental conditions, changes in the composition of baby food products and deficiency of macro- and microelements, chronic somatic diseases, heredity, reduction changes in the chewing apparatus, etc. [15-20]. The result of this influence is a change in the natural position of the teeth, which is registered as a dentofacial anomalies (DFA).

Over the past decades, the frequency of detection of bite anomalies has increased, and the need for therapeutic and preventive measures is 36.9% in case of variable bite, and more than 40% in case of permanent bite, and constantly increases with age [21-24].

Taking into account all of the above, the study of both the prevalence and the degree of influence of various risk factors on the occurrence of orthodontic pathology is relevant.

AIM

The aim of our research was to investigate the regional features of the prevalence of risk factors for the occurrence of orthodontic pathology among the children’s population of Poltava.

MATERIALS AND METHODS

Research methods: sociological, forecasting, bibliosemantic, analytical, medical-statistical. Materials: results of examination by a pediatric dentist of schoolchildren of different age groups (406 children), results of a questionnaire of parents of examined schoolchildren of different age groups (406 respondents), a questionnaire created by the authors and containing 45 questions related to the presence/absence of risk factors for orthodontic pathology in children (socio-economic, behavioral, medical, biological, environmental, organizational), the level of awareness of parents regarding factors affecting children’s health, and satisfaction with medical care.

RESULTS

The age of the children we examined was as follows (by age groups): 6-12 years old – 237 (58.37%), 12-15 years old – 120 (29.56%), 15-18 – 49 (12.07%) (Fig. 1). So, the changed bite was in 58.37% of children, permanent – in 41.63%. Orthodontic pathology of various types was detected during the examination in the period of the changed bite – in 48.6% of children, in the period of the permanent bite – in 52.4% of children. Thus, every second child has one or another pathology of the dentofacial area.

During the study, we identified the prevalence of risk factors for orthodontic pathology affecting children in the antenatal and postnatal periods (Table 1).

The goal of the next stage of our study was to analyze the associations between the detection of orthodontic pathology and the effect of risk factors that have already been studied by researchers, namely: social status, place of residence, financial security, and age of the child over 15 years old. In our study, among social and medical-demographic factors, only social status was found to be a

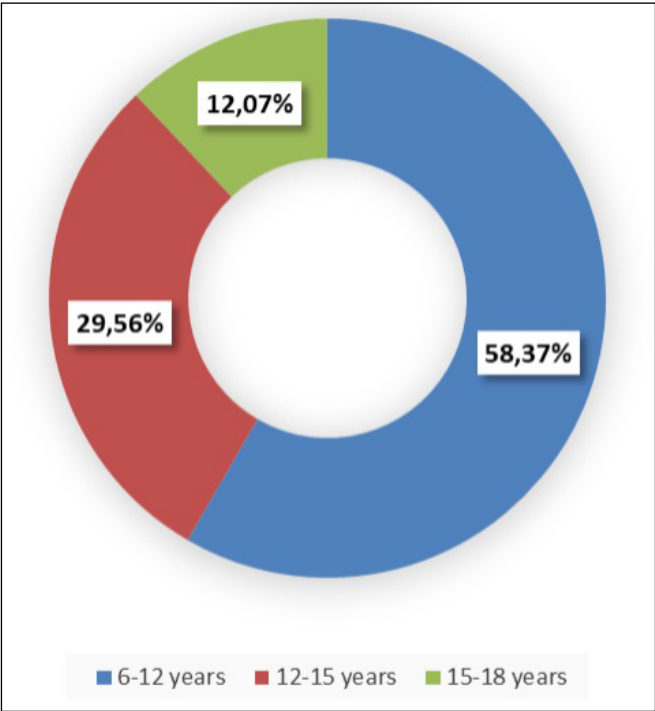


Fig. 1. Distribution of examined children by age groups
Picture taken by the authors

significant relationship in simple logistic regression analysis: if parents are blue-collar workers, the chance of detecting orthodontic pathology increases by 1.4 times (OR 1,4 [95% CI 1,034-2,097]) (Table 2).

The use of a pacifier, as shown by many researchers and also indicated in breastfeeding recommendations, leads to a violation of the bite of teeth to the same extent as poor nutrition of the mother [13, 15-17]. We have classified these two factors as behavioral because they track a person’s choice to act in one way or another. In addition, we asked questions about tobacco and alcohol use, and poor maternal nutrition during pregnancy, but none of the respondents indicated that they led an unhealthy lifestyle during this time. Significant associations were found between the use of a pacifier, the chances of detecting orthodontic pathology increase by 1.8 times (OR 1,80 [95% CI 1,08-3,02]) (Table 3).

Incidence in the first years of life could affect the normalization of ontogenesis and calcium metabolism and subsequently cause malocclusion. Complications during childbirth – especially with breech presentation, the actions of the obstetrician-gynecologist at the time of delivery of the fetal head, the application of obstetric forceps, which can affect the child’s growth zones and also contribute to the occurrence of this nosology. Removed primary and permanent teeth, trauma may indicate odontogenic diseases, which can subsequently cause orthodontic pathology [13, 15-17]. Significant reliable associations of the occurrence of orthodontic pathology with somatic morbidity at 1 year of life (OR 1,79 [95% CI 1,08-2,98]), caries (OR 2,04 [95% CI 1,35-

Table 1. Prevalence of risk factors identified in different periods of child development (according to parent survey data)

The influence of risk factors in the antenatal period of child development (abs., %)	The influence of risk factors in the postnatal period of child development (abs., %)
Mother's diet during pregnancy is unsatisfactory – 12 (2,9%)	Diseases of a child in the first year of life – (dysbacteriosis) – 74 (18,2%);
Acquired diseases during pregnancy – 18 (4,4%);	Artificial feeding – 166 (40,9%);
Stressful situations during pregnancy – 50 (12,3%)	Use of a pacifier – 122 (30,0%)
Occupational hazards during pregnancy – 11 (2,7%);	Bad habits of the child: finger sucking, tongue sucking – 52 (12,8%);
Consumption of alcohol and tobacco during pregnancy – 4 (1,0%);	Concomitant diseases – 46 (11,3%);
Adverse factors during pregnancy (gynecological diseases) – 9 (2,2%);	
Non-compliance by the mother with the work and rest regime during pregnancy – 5 (1,2%);	The child's diet in infancy (timely introduction of complementary foods, variety and rationality of the child's diet) is unsatisfactory – 3 (0,7%)
Pregnancy complications – 52 (12,8%);	
Complications during childbirth – 83 (20,4%);	

Source: compiled by the authors of this study

Table 2. Associations between social and medical-demographic risk factors of parents and the detection of orthodontic pathology in children ($p < 0,05$)

Social and medical-demographic risk factors	Examined children, n=406		Odds ratio (95% CI)	p
	orthodontic pathology detected, n=161 abs. (%)	orthodontic pathology no detected, n=245 abs. (%)		
Social status: working profession of parents, n=191	84 (44,0)	107 (56,0)	1,41 (1,03-2,09)	0,050

Source: compiled by the authors of this study

Table 3. Associations between maternal behavioral risk factors and the detection of orthodontic pathology in children ($p < 0,05$)

Maternal behavioral risk factors	Examined children, n=406		Odds ratio (95% CI)	p
	orthodontic pathology detected, n=161 abs. (%)	orthodontic pathology no detected, n=245 abs. (%)		
Use of pacifier, n= 320	136 (42,5)	184 (57,5)	1,80 (1,08-3,02)	0,015

Source: compiled by the authors of this study

Table 4. Determined associations between medical factors and the detection of orthodontic pathology in children ($p < 0,05$)

Medical factors	Examined children, n=406		Odds ratio (95% CI)	p
	orthodontic pathology detected, n=161 abs. (%)	orthodontic pathology no detected, n=245 abs. (%)		
Somatic disease in the first years of life, n=74	38 (51,4)	36 (48,6)	1,79 (1,08-2,98)	0,017
Diagnosed dental caries, n=225	106 (47,1)	119 (52,9)	2,04 (1,35-3,08)	0,001
Removal of permanent teeth due to caries, n=60	31 (51,7)	29 (48,3)	1,75 (1,01-3,04)	0,032
Concomitant diseases in the child (otorhinolaryngological pathology), n=46	34 (73,9)	12 (26,1)	5,18 (2,59-6,35)	0,001
Orthodontic pathology in the family, n=70	55 (78,6)	15 (21,4)	3,93 (2,06-7,49)	0,001

Source: compiled by the authors of this study

3,08)), removal of permanent teeth due to caries (OR 1,75 [95% CI (1,01-3,04)]), concomitant diseases in the child (OR 5,18 [95% CI (2,59-6,35)]) and orthodontic pathology in the

family (OR 3,93 [95% CI (2,06-7,49)]) were found. All these factors increase the chances of orthodontic pathology in a child (Table 4).

Table 5. Determined associations between sanitary and hygienic factors of parents and children and the detection of orthodontic pathology ($p<0,05$)

Sanitary and hygienic factors of parents and children	Examined children, n=406		Odds ratio (95% CI)	p
	orthodontic pathology detected, n=161 abs. (%)	orthodontic pathology no detected, n=245 abs. (%)		
Bad condition of the oral cavity, n=48	26 (54,2)	22 (45,8)	1,95 (1,06-3,58)	0,022
Low sanitary and hygienic awareness of parents, n=24	2 (8,3)	22 (91,7)	0,13 (0,03-0,55)	0,001
The child visited the dentist only for treatment, n=240	78 (32,5)	162 (67,5)	0,48 (0,32-0,72)	0,000
The child did not visit the orthodontist for preventive purposes, n=144	43 (29,9)	101 (70,1)	0,52 (0,34-0,80)	0,002

Source: compiled by the authors of this study

Table 6. Determined associations between adverse factors during pregnancy and the detection of orthodontic pathology ($p<0,05$)

Adverse factors during pregnancy	Examined children, n=406		Odds ratio (95% CI)	p
	orthodontic pathology detected, n=161 abs. (%)	orthodontic pathology no detected, n=245 abs. (%)		
Occupational hazards, n=11	9 (81,8)	2 (18,2)	7,19 (1,53-33,74)	0,005

Source: compiled by the authors of this study

The next step was to investigate sanitary and hygienic factors that would indicate the preventive awareness of patients and their parents. It was found that the presence of poor oral health increases the chances of detecting orthodontic pathology (OR 1,95 [95% CI (1,06-3,58)]). At the same time, the chances of detecting this nosology decrease with: low sanitary and hygienic awareness of parents (OR 0,19 [95% CI (0,03-0,55)]), not having the child visit an orthodontist for preventive purposes (OR 0,52 [95% CI (0,34-0,80)]). Obviously, if a child does not visit an orthodontist, it is more difficult to detect pathology in them. The low level of sanitary and hygienic education of parents may be the reason that parents are not motivated to bring their child to an orthodontist for earlier detection of pathology (Table 5).

Among the organizational factors, we indicated the presence of an orthodontist in the settlement. We did not find any significant associations between organizational factors and detected orthodontic pathology.

Among the adverse factors experienced by the mother during pregnancy, only one significant relationship was found between occupational hazards (heavy physical labor and radiation from a computer) and the occurrence of orthodontic pathology, which increase the chances of detecting orthodontic pathology (OR 7,19 [95% CI (1,53-33,74)]), which, according to researchers, may also affect ontogenesis [13, 15-17] (Table 6).

DISCUSSION

According to the literature, numerous factors have been identified that can lead to the occurrence of orthodontic

pathology and operate both in the antenatal and postnatal periods [15]: pregnancy complications; previous illnesses, occupational hazards and stressful situations during pregnancy; alcohol and tobacco use during pregnancy; failure of the mother to observe the work and rest regime, poor nutrition during pregnancy; complications during childbirth; increased morbidity of the child in the first years of life; artificial feeding; use of a pacifier; harmful habits of the child himself: sucking his finger, tongue; concomitant diseases of the child. Scientists around the world are devoting a lot of attention to this issue, studying both the prevalence of the pathology among children and risk factors. There is 1799 adolescents aged 11-15 years old from 18 middle schools in 6 districts of Shanghai were recruited to investigate oral health status and related risk factors using cluster random sampling method in 2021 and the prevalence of malocclusion in adolescents in Shanghai was 83.5% [25]. A study of 503 Japanese children aged 3-6 years [26] showed that 62.0% of preschool children in the present study exhibited malocclusion, and 27.8% exhibited incompetent lip seal. Nail biting was the most frequent oral habit with a prevalence of 18.9%. Nasal obstruction was recorded in 30.4% of children. The results of binary logistic regression showed that incompetent lip seal was significantly related to malocclusion, and that nail biting was significantly negatively related.

Sadoun C. at all [27] found that the chances of diagnosing a malocclusion were higher for children with bottle nutrition when compared to breast-fed children. Breastfeeding provides protection against malocclusions. In the same manner, persistent NNSH habits appeared to be associated with in-

creased chances of having malocclusions. The longer the child was breastfed, the shorter the duration of the pacifier habit and the lower the risk of developing moderate/severe malocclusions. The duration of the habits has a positive influence on the appearance of occlusion defects. A study conducted in France examined social characteristics (collected during pregnancy), neonatal characteristics (collected at birth), duration of breast-feeding (collected prospectively), sucking habits at 3 years, and open lips (as an indicator of mouth breathing), and two logistic regressions were performed. It has been found that preterm birth appears to be a risk factor specific for posterior crossbite (OR: 3.13; 95% CI: 1.13-8.68), whereas small for gestational age seems to be associated with a lower risk of posterior crossbite (OR: 0.32; 95% CI: 0.12-0.87). Ongoing pacifier or thumb sucking at 3 years is a risk factor for both posterior crossbite and anterior open bite.

In our study, using the method of simple logistic regression, regional features of the prevalence of risk factors associated with the occurrence of orthodontic pathology were

identified: the chances of detecting orthodontic pathology increase with the use of a pacifier, somatic morbidity in the first year of life (dysbacteriosis, rickets), the presence of caries in the child (complicated caries), the removal of permanent teeth due to caries, concomitant diseases (otorhinolaryngological pathology) in the child, the presence of heredity (orthodontic pathology in the family), and occupational hazards during the mother's pregnancy.

CONCLUSIONS

The identified risk factors for orthodontic pathology are mostly modifiable, that is, they are amenable to correction. Therefore, it is extremely necessary for pediatricians, family doctors and pediatric dentists to carry out both preventive measures to prevent the negative impact of these factors, and explanatory work with parents of children, who must be aware of the importance and necessity of prevention.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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