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Assessment of Treatment Needs with Mini-invasive Prosthetic Reconstructions in Adolescents

Ocena zapotrzebowania na leczenie z zastosowaniem małoinwazyjnych rekonstrukcji protetycznych u młodocianych

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Abstract

Background. Clinical observations reveal frequent occurrence of disorders affecting anterior part of dental arch and influencing the esthetic appearance of patient and proper functioning of the stomatognathic system.

Objectives. Estimating the requirements for esthetic stomatological treatment among secondary school and university students.

Material and Methods. Material of study was seldom selected group of 50 secondary school pupils and 50 students of Faculty of Stomatology, method of the study consisted of stomatological examination of oral cavity with special regard to hereditary and inquired disorders of hard dental tissues of anterior teeth, and moreover, the disturbances in number or shape or position of anterior teeth.

Results. Results were presented in 6 tables. Frequent occurrence of genetic and acquired disturbances in natural dentition has been observed among the examined populations, which creates a great demand for dental treatment with application of mini-invasive prosthetic reconstructions of veneers type.

Conclusions. 1. Prevalence of inquired or hereditary disturbances in natural dentition was found to be relatively high in the studied adolescents. 2. Hypodontia, microdontia and enamelodentinopathies were more frequently seen in females, while the disturbances in tooth position were more prevalent in males. 3. Disturbances of natural dentition located in the anterior part of dental arch may cause a great problem of esthetic or psychological nature. 4. In the studied adolescents there is a great need for esthetic treatment with using mini-invasive prosthetic reconstructions (*Dent. Med. Probl.* 2005, 42, 3, 413–418).

Key words: prosthetic needs, veneers, esthetic restorations.

Streszczenie

Wprowadzenie. Obserwacje kliniczne wskazują na częste występowanie zaburzeń wrodzonych i nabytych w przednim odcinku łuku zębowego, upośledzających wygląd estetyczny pacjenta i prawidłowe funkcjonowanie układu stomatognatycznego.

Cel pracy. Określenie zapotrzebowania na stomatologiczne leczenie estetyczne u młodzieży szkół średnich i wyższych. **Materiał i metody.** Badaniem objęto losowo wybraną grupę 50 uczniów szkół średnich i 50 studentów stomatologii. Metoda badań polegała na przeprowadzeniu badania stomatologicznego, w którym rejestrowano zmiany w obrębie twardych tkanek zębów oraz odchylenia kształtu, liczby i położenia zębów przednich.

Wyniki. Wyniki badań przedstawiono w 6 tabelach. W badanych populacjach stwierdzono częste występowanie zaburzeń rozwojowych wrodzonych i nabytych w uzębieniu naturalnym, co stwarza duże zapotrzebowanie na leczenie stomatologiczne z zastosowaniem estetycznych małoinwazyjnych rekonstrukcji protetycznych typu licówek.

Wnioski. W badanych populacjach stwierdzono częste występowanie zaburzeń rozwojowych wrodzonych i nabytych w uzębieniu naturalnym, przy czym niektóre z nich dominowały głównie u dziewcząt, tj. hipodoncja i mikrodoncja, enamelodentinopatie i zaburzenia barwy zębów. Zaburzenia te są dużym problemem natury estetycznej i psychologicznej, ponieważ głównie dotyczą przedniego odcinka łuku zębowego (*Dent. Med. Probl.* 2005, 42, 3, 413–418).

Słowa kluczowe: zapotrzebowanie na leczenie protetyczne, licówki, estetyczne uzupełnienia.

Clinical observations and data from literature have indicated the increased prevalence of disturbances regarding number, shape or color of anterior teeth in the adolescent populations. Moreover, inquired or hereditary hard dental tissue pathologies (enamelodentinopathies) are often seen. The disturbances have a great importance due to causing some esthetic or psychological problems to the young people [1–4]. Majority of the disturbances are located in the anterior part of dental arch, and, thus, it is difficult to eliminate them using traditional restorative procedures. Usually, in such cases, prosthetic crowns are made, however, those prosthetic reconstructions are connected with an invasive and irreversible preparation of the abutment teeth [5–6]. Moreover, in the anterior part of dental arch, the malpositions of teeth in relation to alveolar ridge are often found such as teeth crowding, diastems or tremas. The above mentioned disturbances in tooth positions may be corrected using orthodontic appliances. However, such treatment option is long lasting and usually very costly [7–8]. Nowadays, due to great advances in stomatological materials and technologies, it is possible to use less invasive prosthetic appliances such as composite or ceramic veneers or adhesive bridges requiring a minimum teeth preparation, and, thus, allowing for preserving hard dental tissues as much as possible [9–16]. Moreover, those adhesive prosthetic reconstructions allow for a relatively fast improvement of esthetic problems in the anterior part of dental arch. Clinical observations of many authors revealed that the mini-invasive prosthetic reconstructions are very useful and long-lasting. Also, a possibility of traumatic injuries to dental pulp or marginal periodontium was noted to be rather rare due to relatively less preparation of tooth surface as well as a very slight reduction of hard dental tissues of abutment teeth needed for that kinds of prosthetic reconstructions [17–21].

The goal of the present paper was to establish the need for esthetic prosthetic treatment in adoles-

Table 1. Number of examined secondary schoolchildren in dependence on gender and age

Tabela 1. Podział badanych uczniów szkół średnich ze względu na płeć i wiek

Gender (Płeć)	Age in years (Wiek w latach)				
	14	15	16	17	total (razem)
Female (Kobiety)	2	7	8	21	37
Male (Mężczyźni)	–	1	7	4	13
Total (Razem)	2	8	15	25	50

cent population of secondary school and university students.

Material and Methods

Material of the study was a randomly selected group of Wrocław adolescent population, e.i. 50 secondary schoolchildren and 50 high level school students of Faculty of Stomatology. The age of the first study group ranged from 14 to 17 years, with the mean age of 15.96. The age of dental students ranged from 21 to 35 years, with the mean age of 24.46. The number of studied subjects in relation to age and gender is presented in Table 1 and 2. All subjects were informed about the purpose and procedures used in the investigation and signed a written consensus. Moreover, the study obtained an approval of Bioethic Commission at Wrocław Medical University (No 316/2002).

In all the subjects, a clinical examination of the mouth was carried out using dental mirror and periodontal probe, and a dental operating light for illumination. The following clinical parameters were recorded: abfractions; pathological abrasion of teeth; diastemas; tremas; disturbances in number and shape

Table 2. Number of university students in dependence on gender and age

Tabela 2. Podział badanych studentów ze względu na płeć i wiek

Gender (Płeć)	Age in years (Wiek w latach)							total (razem)
	21	22	23	24	25	26	> 30	
Female (Kobiety)	–	3	13	8	4	7	2	37
Male (Mężczyźni)	1	3	1	2	4	1	1	13
Total (Razem)	1	6	14	10	8	8	3	50

of permanent teeth; improper position of teeth in relation to alveolar ridge; crowding of teeth; pathological changes of hard dental tissues not caused by caries disease (enamelodentinopathies); discoloration of teeth; traumatic injuries of teeth and their location in enamel, dentin or dental pulp. The anamnestic examination was also performed to explain a possible cause of some dental disturbances found in the studied population. Data from the examination were recorded in special prepared cards.

The obtained results of the study were subjected to statistical analysis using chi-square test or Fisher test. Differences between groups were considered to be statistically significant if both tests showed $p < 0.05$. EPIINFO Ver. 3.2 system was used for statistical analysis.

Results and Discussion

Table 3 presents the prevalence of disturbances in number and shape of permanent teeth in the studied population. The disturbances were found in 16 subjects. Hypodontia was diagnosed in 7 subjects, and it was found mainly in female groups from both secondary school ($n = 3$) and university students ($n = 3$), however, the difference in prevalence of hypodontia between female and male groups was not statistically significant ($p > 0.05$). Hyperdontia in a form of additional lower lateral incisor was found in one female dental student. Disturbed tooth shape appeared in 8 subjects: macrodens was found in one schoolgirl. Microdens was also mainly prevalent in females, e.g. in 2 schoolgirls and 2 female dental students, however, the difference in prevalence of microdens in relation to gender was not statistically significant ($p > 0.05$). Dentes emboliformes ($n = 1$) and enameloma ($n = 1$) were recognized only in females, especially those from dental student group.

Results of the study on the prevalence of disturbances in tooth positions are collected in Table 4. It appeared that such disturbances as tooth crowding, diastemas, tremas or tooth malposition in relation to the alveolar ridge are very frequent in the studied population. The total percentages of the disturbances mentioned above were appropriately 29%, 20%, 42% and 34%. Distribution of those disturbances seems to be similar in both female and male groups. However, taking into account the ratio of males to females in studied population ($R = 26 : 74 = 1 : 2.8$), it may be pointed out that the prevalence of analyzed disturbances was almost 3 times higher in males than in females. The observed differences in prevalence of the mentioned disturbances were statistically significant ($p < 0.05$).

Table 5 illustrates the frequency of various kinds of pathologies involving hard dental tissues. The pathologies were recognized in 78 cases. Among them, there were enamelodentinopathies, which were found in 28 subjects, mainly in females ($n = 25$). These disturbances were more often seen in schoolgirls ($n = 18$) than in female dental students ($n = 7$). Hypocalcificatio was the most frequent kind of enamelodentinopathies, and it was found in 12 schoolgirls, while amelogenesis imperfecta hereditaria was the rarest one, and it was diagnosed in one female dental student. Moreover, the enamel hypoplasia was found only in female group (2 schoolgirls and 3 female students). Fluorosis was recognized in both females ($n = 6$) and males ($n = 3$), and it appeared to be not dependent on gender. In Table 5, there are also included traumatic injuries of anterior teeth. Those injuries were seen in 16 cases. It may be a great surprise that the injuries were more frequent seen in females ($n = 12$) than in males ($n = 3$). However, the observed difference in frequency of tooth injuries between male and female were not statistically significant

Table 3. Disturbances in number and shape of teeth in studied population

Tabela 3. Zaburzenia liczby i kształtu zębów w badanej populacji

Kind of disturbances (Rodzaj zaburzenia)		Schoolchildren (Uczniowie) ($n = 50$)			Students (Studenci) ($n = 50$)			Total (Razem) ($n = 100$)		
		♀	♂	Σ	♀	♂	Σ	♀	♂	Σ
Number of teeth (Liczba zębów)	<i>hyperdontia</i>	–	–	–	1	–	1	1	–	1
	<i>hypodontia</i>	3	–	3	3	1	4	6*	1*	7
Shape of teeth (Kształt zębów)	<i>macrodens</i>	1	–	1	–	–	–	1	–	1
	<i>microdens</i>	2	1	3	2	–	2	4**	1**	5
	<i>dentes emboliformes</i>	–	–	–	1	–	1	1	–	1
	<i>enameloma</i>	–	–	–	1	–	1	1	–	1
Total (Razem)	6	1	7	8	1	9	14	2	16	

* $p = 0.673$ F, ** $p = 0.999$ F.

Table 4. Disturbances in tooth position**Tabela 4.** Zaburzenia położenia zębów

Kind of disturbances (Rodzaj zaburzenia)	Schoolchildren (Uczniowie) (n = 50)			Students (Studenci) (n = 50)			Total (Razem) (n = 100)		
	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ
Crowding (Stłoczenia)	3	8	11	6	6	18	15*	14*	29
Diastemas (Diastemy)	4	6	10	7	3	10	11**	9**	20
Trems (Tremy)	11	18	29	9	4	13	20+	22+	42
Malposition to alveolar ridge (Nieprawidłowe położenie zębów)	12	14	26	6	2	8	18^	16^	34
Total (Razem)	30	46	76	34	15	49	64	61	125

* p = 0.00275	$\chi^2 = 8.97$	$rr_K = 0.62$	95% CI 0.43 ÷ 0.90	$rr_M = 2.86$	95% CI 1.51 ÷ 5.41
** p = 0.0600	$\chi^2 = 3.54$	$rr_K = 0.70$	95% CI 0.46 ÷ 1.05	$rr_M = 2.12$	95% CI 1.11 ÷ 4.03
+ p = 0.00000	$\chi^2 = 23.88$	$rr_K = 0.51$	95% CI 0.37 ÷ 0.71	$rr_M = 7.60$	95% CI 2.83 ÷ 20.4
^ p = 0.00135	$\chi^2 = 10.27$	$rr_K = 0.62$	95% CI 0.45 ÷ 0.87	$rr_M = 3.11$	95% CI 1.58 ÷ 6.09

Table 5. Disturbances of hard dental tissues**Tabela 5.** Zaburzenia patologiczne w obrębie twardych tkanek zębów

Kind of disturbances (Rodzaj zaburzenia)		Schoolchildren (Uczniowie) (n = 50)			Students (Studenci) (n = 50)			Total (Razem) (n = 100)		
		♀	♂	Σ	♀	♂	Σ	♀	♂	Σ
Enamelodentinopathies (Enamelodentinopatie)	<i>amelogenesis imperfecta</i>	–	–	–	1	–	1	1	–	1
	<i>hypocalcificatio</i>	12	–	12	1	–	1	13	–	13
	<i>hypoplasia enameli</i>	2	–	2	3	–	3	5	–	5
	<i>fluorosis</i>	4	2	6	2	1	3	6	3	9
Traumatic injuries (Uraz mechaniczny)	enamel (szkliwa)	5	–	5	7	3	10	12*	3*	15
	enamel and dentin (szkliwa i zębiny)	1	–	1	–	–	–	1	–	1
Pathological abrasion (Starcie patologiczne)		–	–	–	4	10	14	4**	10**	14
Wear facets (Tarczki starcia)		28	10	38	14	9	23	42+	19+	61
Abfractions (Ubytki klinowe)		–	–	–	20	–	20	20	–	20
Total (Razem)		24	2	26	38	14	52	62	16	78

* p = 0.753 F					
** p = 0.00015 F	$rr_K = 0.35$	95% CI 0.15 ÷ 0.81		$rr_M = 3.84$	95% CI 2.21 ÷ 6.67
+ p = 0.217					

($p > 0.05$). Signs of pathological abrasion of teeth were not found in schoolchildren group. However, 14 dental students revealed the tooth abrasion, and that pathology was more often seen in males ($n = 10$) than in females ($n = 4$). The observed difference in prevalence of tooth abrasion in depen-

dence on gender was statistically significant ($p < 0.05$). Isolated wear facets were very frequently seen in both schoolchildren and student groups ($n = 61$). The disturbance does not reveal any statistically significant difference dependant on gender ($p > 0.05$). Abfractions were recognized only

Table 6. Disturbances in tooth color**Tabela 6.** Zaburzenia barwy zębów

Cause (Przyczyna zaburzenia)	Schoolchildren (Uczniowie) (n = 50)			Students (Studenci) (n = 50)			Total (Razem) (n = 100)		
	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ
Pharmacological agents (Leki)	–	1	1	2	1	3	2*	2*	4
Coffee and tea (Kawa, herbata)	1	–	1	1	1	2	2	1	3
Endodontic treatment (Leczenie endodontyczne)	–	–	–	7	–	7	–	–	7
Other (Inne)	4	4	8	1	2	3	5	6	11
Discoloration of fillings (Przebarwione wypełnienia)	1	–	1	1	2	3	2	2	4
Total (Razem)	6	5	11	12	6	18	11	11	29

* p = 0.277 F.

in female students (n = 20). The last disturbance was not seen in schoolchildren group.

The frequency of particular kinds of tooth discoloration is presented in Table 6. Post-pharmaceutical discoloration of teeth appeared in 4 subjects (1 schoolboy and 3 dental students). Discoloration of teeth due to use some beverages (e.i.

coffee and tea) was seen in 3 subjects. Endodontic tooth discoloration was observed in 7 female students, while the discoloration of fillings was found in both schoolchildren (n = 1) and students (n = 3). In 11 cases the cause of tooth discoloration was not established.

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